



## MONOGRAPH OF FLAX SEEDS

*Linum usitatissimum* Linn

### INTRODUCTION

**Botanical Name** : *Linum usitatissimum*

**Family** : Linaceae

**Common Name** : Common flax or Linseed

**Part Used** : Seed



**Figure** : Linseed Plant

### HISTORY :

It is a food and fiber crop cultivated in cooler regions of the world. Textiles made from flax are known in the Western countries as linen, and traditionally used for bed sheets, underclothes, and table linen. In addition to referring to the plant itself, the word "flax" may refer to the unspun fibers of the flax plant. The plant species is known only as a cultivated plant, and appears to have been domesticated just once from the wild species *Linum bienne*, called pale flax



### **GEOGRAPHICAL SOURCE :**

It is cultivated extensively as a source of fibres in Algeria, Egypt, Greece, Italy and Spain; as a source of oil in Afghanistan, India and Turkey; and in Russia (now CIS – countries) for both oil and fibre. It is also found in several temperate and tropical zones.

### **CULTIVATION AND COLLECTION :**

The crop is sown either broadcast or is drilled in lines 20 to 30cm apart. It does best on clay loams, deep clayey black soils. Areas with the annual rainfall ranging from 45-75cm are best suited for its cultivation. The linseed crop starts, maturing by the middle of February, depending on winter spread and sowing time. Harvesting is done when the crop is ripe with a sickle or by uprooting the plants. When the fibre is also desired along with seed, the harvesting of the crop is done at the stage of capsule maturity even when the crop is light green.





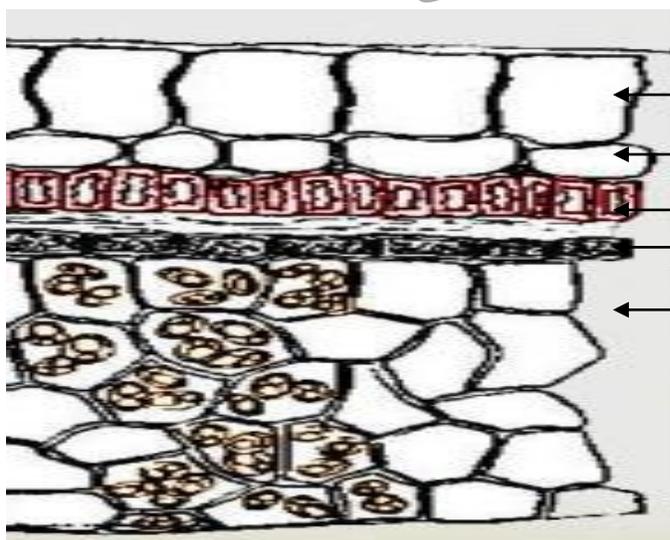
## DESCRIPTION

### MACROSCOPY

- **Colour** : Reddish brown
- **Odour** : Characteristic odour
- **Shape** : Oval and strongly flattened
- **Size** : Length = 4-6 mm; Width = 2-3 mm.



### MICROSCOPY



- ← Testa
- ← Hypodermis
- ← Sclerids
- ← Pigment Layer
- ← Endosperm



### Transverse section of Linseed Testa:

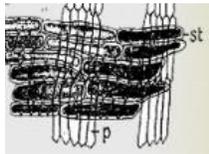
#### (A) Outer Coat: Outer integument

- Epidermis: Single layer, polygonal tabular cells with thin anticlinal walls filled with mucilage
- Subepidermis: One or two layers of cylindrical collenchymas

#### (B) Inner Coat: Inner Integument

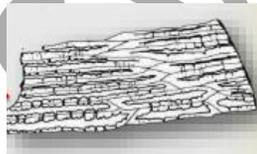
- Sclerenchymatous layer: Longitudinally elongated, lignified sclerides, 120-190 $\mu$  long and 14 – 17 $\mu$  wide, thick walled, pitted, very small lumen
- Parenchymatous layer: One or two layers, thin tangentially elongated collapsed parenchymatous cells
- Pigment layer: Single layer of flattened polygonal pigment cells with reddish brown contents
- Endosperms: Polyhedral, cellulosic parenchyma with oil globules and aleurone grains.
- Aleurone grains: upto 20  $\mu$  in diameter with globoid crystals
- Cotyledon: Cells and cell contents are similar to endosperm

### POWDERED CHARACTERISTICS



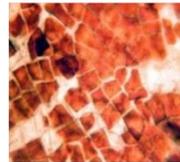
1

1 Sclereid cells crossing over parenchyma,



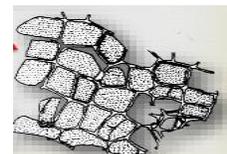
2

2 Thick walled elongated cells of sclerenchyma layer



3

3 Pigment cells dark brown,



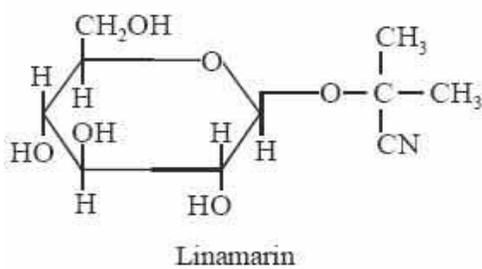
4

4 Epidermal layer containing mucilage



## CHEMICAL CONSTITUENTS

- The ripe seeds of linseed contain **cyanogenetic glycosides** known as *linamarin* (or *phaseolunatin*). **Linamarin** upon enzymatic hydrolysis yields HCN which actually renders the seeds highly poisonous.
- The oil of Flaxseed contains about 50% of alpha-linoleic acid along with oleic acid, p-coumaric acid, stearic acid, palmitic acid, arachidic acid, cyanogenic glycosides, sitosterol, campesterol, phytosterols and an enzyme called *linase*.
- Flaxseed is rich in lignans, which contain antioxidant and plant estrogen qualities.
- Omega-3 essential fatty acid is heading the health benefits of Flaxseed with its extremely beneficial effects on heart and its power to resist the incidence of cancerous tumors, discard toxins and bad cholesterol in the system. Flax seed oil contains Omega-6, Omega-9 fatty acids and certain other healthy nutrients.
- Linseed contains Vitamin B1, B2, B3 and B5 along with calcium, magnesium, zinc, selenium, phosphorus, iron, manganese, potassium, about 29% of carbohydrates, 18% of protein and a massive 95% of fiber.



## CHEMICAL TEST

- The mucilage of linseed seed gives a distinct red colour on being treated with Ruthenium Red Solution.

## THERAPEUTIC USES

- Therapeutically, the linseed oil is mostly recommended for the external applications only; liments and lotions.
- It is employed in the treatment of scabies and other skin disease in combination with pure flowers of sulphur.



- As the linseed oil has an inherent very high '**iodine value**' it is used mostly in the preparation of non staining '**iodine Ointment**' and several other products such as: '**Cresol with Soap**.'
- Commercially, it is one of the most important '**drying oil**'; and, therefore, substantially huge amounts are exclusively used for varnishes and paints.
- Linseed oil finds its extensive application in the manufacturer of soap, grease, polymer, plasticizer, polish and linoleum.
- Linseed seeds source of essential fatty acids supplement
- The lignans obtained from the seed cake left after the extraction of fixed oil is used as nutraceutical as phytoestrogen





## REFERENCES

Franklyn De Silva S. and Alcorn J "Flaxseed Lignans as Important Dietary Polyphenols for Cancer Prevention and Treatment: Chemistry, Pharmacokinetics, and Molecular Targets" *Pharmaceuticals* 2019, 12, 68-132