VIVEKANANDA COLLEGE
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NAAC ACCREDITED ‘A’ GRADE

Topic: Seed

Course Title: B.Sc. Botany General CBCS)

Paper: CC2/GE2

Unit: 4.3

Semester: II

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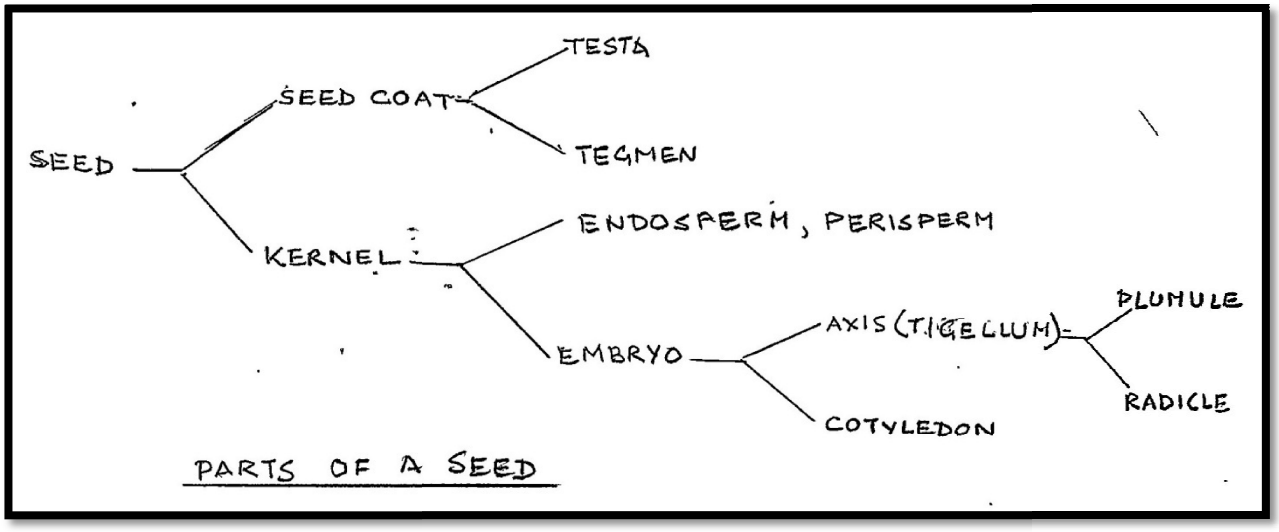
Name of the Department: Department of Botany

SEED

Seed is the characteristic structure of spermatophytes or seed plants including both angiosperms and gymnosperms. After fertilization the ovule is transformed into the seed. It consists of an embryo protected by the seed coat (developed from the integuments). In angiosperms (Angion=case & spermos=seed) the seed is encased within the fruit, while in gymnosperms (Gymno=naked) the seeds are naked or exposed on carpellary leaves. Seeds of angiosperms again may contain a single cotyledon (**monocotyledonous**) or two cotyledons (**dicotyledonous**). Monocot and dicot seeds may be either **exalbuminous** (non-endospermic) or **albuminous** (endospermic).

Basically the seed has two parts, the **kernel** and the **seed coat**. The seed coat has two layers outer **testa** and inner **tegmen**. The kernel consists of **embryo** (the young seedling) and the **endosperm** (the nutritive tissue). The embryo axis called **tigellum,** has **plumule** towards the upper pole (which later forms the shoot) and **radicle** towards the lower pole (which later forms the root). The rest of the kernel is composed of the **cotyledons** (seed leaves).The point of attachment of the cotyledon(s) to the axis is the cotyledonary node. The small portion of the axis between this node and the radicle is called **hypocotyl** and the portion between this node and the plumule is called **epicotyl**.

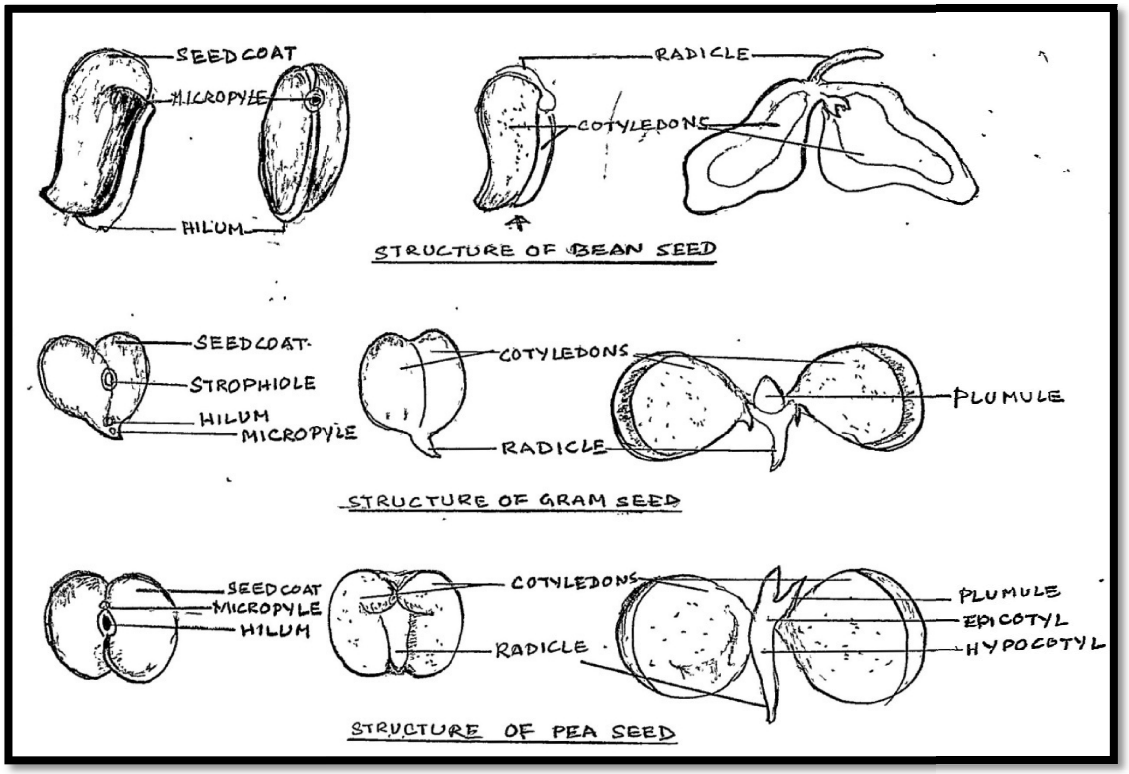


Types of seeds:

- **Dicotyledonous exalbuminous seed**-Examples of such seeds are gram (*Cicer arietinum*), pea (*Pisum sativum*) bean (*Dolichos lablab*) etc.

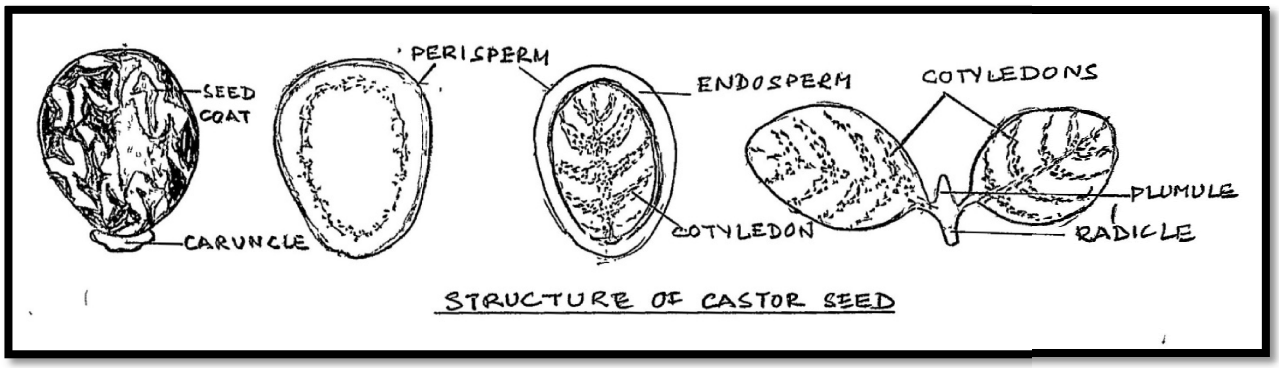
  In **gram seed,** the testa is brown and thick, while the tegmen is whitish, thin, papery and adherent to the testa. On one side of the projected end there is a scar called **hilum** with a small pore (**micropyle**) below. The ridge is called **strophiole**. Inside the seed coat is the kernel with two thick and fleshy cotyledons and the tigellum with the radicle nd plumule.
  In **pea seed,** the testa is whitish and tough, while the tegmen is thin and membranous. On one side of the testa is an elongated scar called hilum with the micropyle below. A short ridge is present along the hilum called **raphe**. The kernel is similar to gram seed.

  In **bean seed,** the testa and tegmen are fused to form a blackish or brownish seed coat. There is a whitish ridge called raphe with the hilum below and opposite to the hilum is the micropyle. The kernel is similar to gram seed.



- **Dicotyledonous albuminous seed-**Castor (*Ricinus communis*) is an example of this type of seed.

  In **castor seed**, the seed coat comprises of a hard, brittle, blackish or brownish testa with a cap-like **caruncle** (fleshy outgrowth) at the micropylar region. The caruncle hides the hilum. There is a distinct longitudinal raphe. Tegmen is absent. The kernel consists of a thin papery **perisperm** over the endosperm, inside which is present the embryo with two thin leaf-like cotyledons and the tigellum with radicle and plumule.

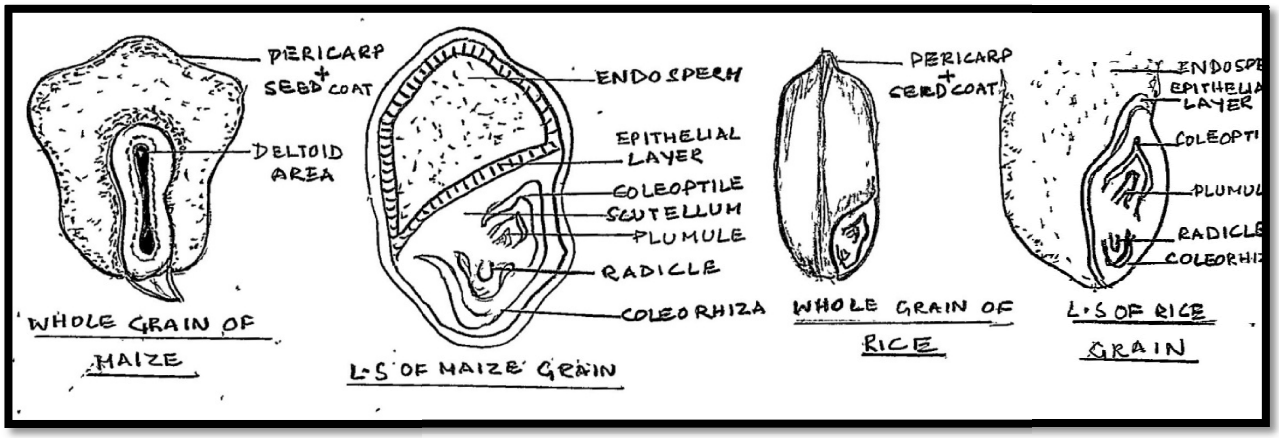


STRUCTURE OF CASTOR SEED

- **Monocotyledonous albuminous seed-**Examples of this type are seeds of maize (*Zea mays*), rice (*Oryza sativa*), wheat (*Triticum aestivum*) etc.

  In **maize grain**, the pericarp (fruit wall) is fused with the seed coat and the hilum and micropyle are not visible. The embryo consists of a single shield-shaped cotyledon called **scutellum.** The embryo axis has an upper plumule covered by the plumule sheath or **coleoptile** and a lower radicle protected by the radicle sheath or **coleorhiza**. The endosperm (food storage tissue) is separated from the embryo by a layer called **epithelium.**

  In **rice grain** also the pericarp and seed coat are inseparable. The major portion of the grain is occupied by the endosperm. At one end of the endosperm os the embryo with a shield-shaped cotyledon and a short axis with the radicle and plumule covered by the coleorhizae and coleoptiles respectively.



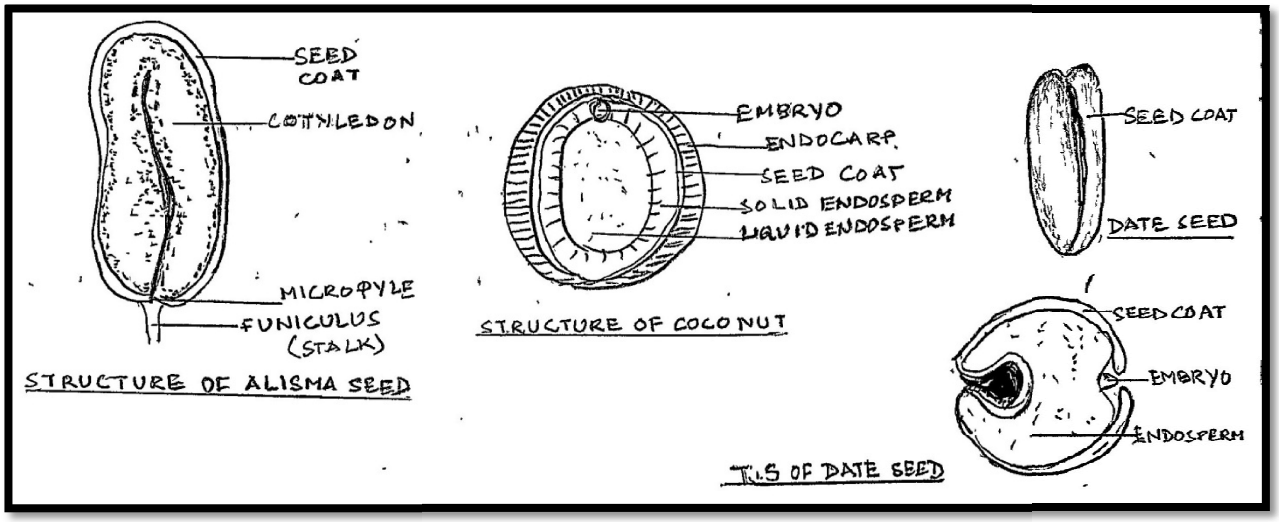
- **Monocotyledonous exalbuminous seed-**Examples of this type of seed are *Sagittaria sagittifolia*, *Alisma plantago* and seeds of most orchids.

  In *Alisma* seed, the seed coat has only one layer, the testa. There is a large curved embryo with a single cotyledon and radicle.

- **Some special monocotyledonous seeds-**Coconut (*Cocos nucifera*) and date (*Phoenix sylvestris*) are two special seeds considered here.

  Coconut is a one-seeded fruit. The dark brown seed coat lies beneath the endocarp and is attached to the white kernel inside. The embryo is embedded in the thick white cartilage, which along with the water constitute the endosperm. The embryo has a large cotyledon attached to the endosperm and functions a a sucker.

  Date seed also has only testa. The embryo is small and lies on one side of the horny endosperm.


SEED COAT
COTYLEDON
MICROPYLE
FUNICULUS (STALK)
STRUCTURE OF ALISMA SEED
EMBRYO
ENDOCARP
SEED COAT
SOLID ENDOSPERM
LIQUID ENDOSPERM
STRUCTURE OF COCONUT
SEED COAT
DATE SEED
SEED COAT
EMBRYO
ENDOSPERM
T.L.S OF DATE SEED