MORPHOLOGY OF FLOWERING PLANTS

THE SEED

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Introduction

- The ripened ovule is called seed.
- **Seed is made up of seed coat and an embryo.**
- **The embryo is made up of radicle, an embryonal axis and two cotyledons (gram, pea) or one cotyledon (wheat, maize).**
- It has adequate reserve food for further development of the embryo and a covering for protection against pathogens, mechanical injury and loss of water.
- The study of seed is called spermology.

STRUCTURE OF DICOTYLEDONOUS SEED:

- **Seed is surrounded by two protective coats.**
- **Out of them outer is testa and inner is tegmen.**
- **The hilum is a scar on the seedcoat throught which the developing seeds were attached to the fruit.**
- **Both coat are absent at one point that is called micropyle**.

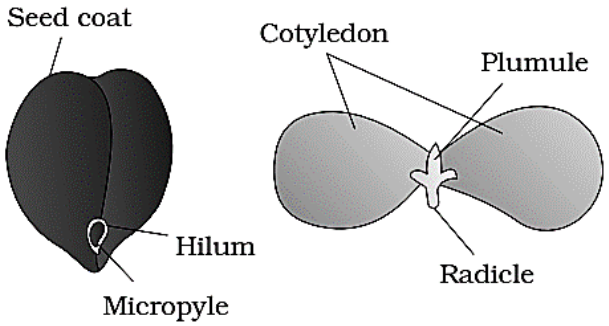

Fig. Structure of dicotyledonous seed

- The part of seed except seed coat is called **kernel**. The latter is composed of embryo with or without endosperm.

- **Embryo contains an embryo axis or tigellum with plumule (future shoot) at one end and radicle (future root) at the other end.**
- The part of tigellum between the radicle and cotyledonary node is called **hypocotyl** while the one between plumule and cotyledonary node is called **epicotyl**.
- The tigellum has a node on which **two cotyledons** are present. **The cotyledons are often fleshy and full of reserve food materials.**

STRUCTURE OF MONOCOTYLEDONOUS SEED

- **In the seeds of cereals such as maize the seed coat is membranous and generally fused with the fruit wall.**
- **The endosperm is bulky and stores food.**
- **The outer covering of endosperm separates the embryo by a proteinous layer called aleurone layer.**
- **The embryo is small and situated in a groove at one end of the endosperm. It consists of one large and shield shaped cotyledon known as scutellum and a short axis with a plumule and a radicle.**
- **The plumule and radicle are enclosed in sheaths which are called coleoptile and coleorhiza respectively.**

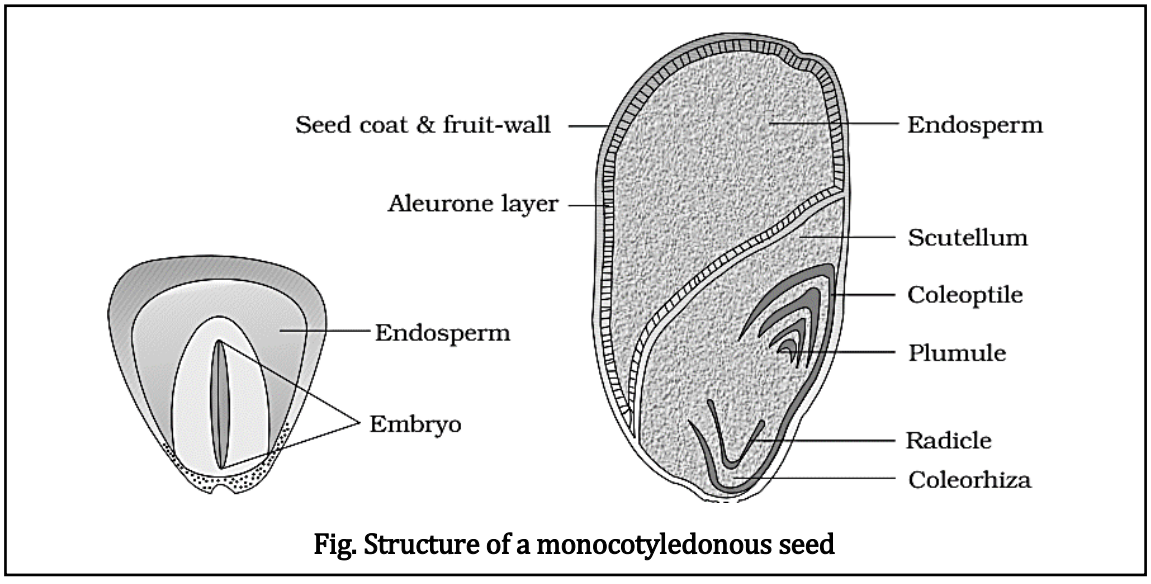

Fig. Structure of a monocotyledonous seed

On the basis of absence or presence of endosperm, the seeds are of two types

(1) Non endospermic or exalbuminous seeds :

- Endosperm is completely consumed during development of the embryo, thus the seeds are called nonendospermic or exalbuminous **e.g.usually dicots (Groundnut, bean, gram and pea) some monocot (orchid).**
- The seed coat is formed by integuments.
- The outer seed coat forms testa and inner seed coat forms tegmen.
- The food is stored in the cotyledons.

(2) Endospermic or albuminous seeds :

- In **monocots and castor (dicot)** embryo does not consume all endosperm (which is formed as a result of double fertilization). So it persists in the mature seed.
- Such seeds are called endospermic or albuminous seeds.
- In these seeds food is stored in endosperm.In such seeds membranous seed coat is fused with fruit wall. Other examples :- **Wheat, maize, onion**

IMPORTANT POINTS

- **Perispermic seeds:** Mostly nucellus is consumed after fertilization due to absorption of food by the endosperm and embryo. The remains of nucellus in the seed is called perisperm. Such seeds are called perispermic seeds **e.g. Piper nigrum (Black pepper), Beet, Castor.**
- **Vivipary:** Sometimes seeds germinate within the fruit while attached to the plant. Such type of germination is called vivipary **e.g. Rhizophora mucronata and Heritiera.**
- **Seed germination is of two types**

(i) **Epigeal germination:** When cotyledons come out on soil due to elongation of hypocotyl, **e.g.castor, cotton, etc.**

(ii) **Hypogeal germination:** When epicotyl elongates and cotyledons are left in the soil, **e.g. pea, gram, groundnut, mango, etc**