

Seeds - Structure and Germination

Fruit: Formed from ripened ovary after fertilisation; protects the seed and helps in its dispersal

Seed: Formed from ripened ovule after fertilisation; contains and protects the embryo from mechanical damage and provides it nourishment through reserved food material.

Types of seed:

- **Monocotyledonous:** Seeds containing single cotyledon. Example, maize, wheat, rice, etc.
- **Dicotyledonous:** Seeds containing two cotyledons. Example, pea, gram, mango, etc.
- **Albuminous or endospermic:** Seeds in which endosperm persists and cotyledons are thin and membranous. Examples of dicot albuminous seeds: poppy and custard apple. Examples of monocot albuminous seeds: cereals, millets, etc.
- **Exalbuminous or non-endospermic:** Seeds in which cotyledons store reserve food materials and become thick and fleshy. Examples of dicot exalbuminous seeds: gram, pea, mustard. Examples of monocot exalbuminous seeds: *Vallisneria*, orchids, etc.

Structural Components of Dicot Seed:

- **Seed coat:** Consists of testa and tegmen; protects the inner delicate parts from any injury and pathogen attack
- **Hilum:** Oval, light-shaded scar that represents the spot where the ovule was attached to the ovary through placenta.
- **Micropyle:** Tiny pore situated close to hilum; helps in absorbing water for seed germination and in diffusion of respiratory gases
- **Cotyledons:** Two thick seed leaves that store reserve food material so as to nourish the growing embryo
- **Embryo:** Attached to one of the cotyledons; consists of radicle (future root) and plumule (future shoot)

Structural Components of Maize Grain:

- Fused fruit wall and seed-coat (testa)
- **Endosperm:** Covers major part of the grain and is rich in starch
- **Aleurone layer:** Outermost, protein-rich layer of endosperm
- **Embryo:** Consists of a single cotyledon, called **scutellum**, a radicle, and a plumule.
 - The radicle is present towards the pointed end of the grain and is enclosed in a protective sheath, called **coleorhiza**.
 - The plumule is present towards the upper broad side and is enclosed in a protective sheath, called **coleoptile**.

- **Seed Germination**

- It is the process of the seed develops into an individual plant utilizing the reserve nutrients present in the cotyledons.

- **Conditions necessary for germination**

1. Water
2. Oxygen
3. Favourable temperature

- **Process of germination**

1. The seed takes up water and swells.
2. The embryonic radicle and plumule start growing and force the seed coat to rupture.
3. The radicle comes out first and forms the root followed by the plumule which develops into the shoot.

- **Types of germination**

1. **Epigeal germination:** in this method the cotyledons are lifted above the ground and they act as the first leaves as a result of the rapid elongation of the hypocotyl. It takes place in seeds like Castor, cotton, sunflower etc.

2. **Hypogeal germination:** in this germination the cotyledons remain inside the soil and the epicotyls elongates and pushes the plumule above. It takes place in seeds like pea, maize, mango etc.

3. **Viviparous germination:** A special mode of germination in which seed starts germinating inside the fruit while it is still attached to the parent plant. Once germinated, the seedling is dropped into the soil where it fixes itself by developing roots. It takes place in mangrove plants, like *Rhizophora* and *Sonneratia*.