Fertilization

Fusion of male and female gametes is called fertilization

Process of fertilization in angiosperms is as follows

A. Entry of the pollen tube in to the ovule:
    - If it enters through micropyle it is called **porogamy**. This is the most common type of entry Eg: Ottelia, Hibiscus
    - Pollen tube enters through the chalaza it is called **cahalzogamy**. It was discovered by Treub in Casuarina
    - If the pollen tube enters through funiculus it is called Mesogamy. Eg. Cucurbita
B. Entry of pollen tube in to the embryo sac
    - The pollen tube enters in to the embryo sac only through micropylar region
    - It occurs either passing in between egg cell and synergid or penetrating through the synergid cell.
    - The entry of pollen tube is directed by filiform apparatus
C. Discahrge of male gametes:
    - After entering the embryo sac pollen tube release its male gametes and vegetative nucleusin the following ways
        i. Tip of the polen tube may burst out
        ii. Degeneration of the tip of the pollen tube
        iii. Formation of an apical pore at the tip of the pollen tube
D. Gametic fusion:
    - Only male nuclei migrate however sometimes the cytoplasm of male gamete may also involved in fertilization.
    - One sperm nuclei fuses with egg cell and forms a diploid zygote (2n)
    - This fusion is called syngamy or fertilization
    - First discovered by Strasburger (18840
E. Triple fusion:
    - The second sperm nucleus fuses with the secondary nucleus of the embryo sac. This results in the formation of triploid endosperm nucleus (PEN).
    - First discovered by Nawaschin in Lilium, Fritillaria.
    - But later found that this phenomenon is universal occurrence in angiosperms
    - Fusion of haploid male nucleus with diploid secondary nucleus is called **Triple fusion**
    - This way both the male gamets released in angiosperm take part in fertilization
    - First fuses with egg to form zygote (Real fertilization) and second nucleus with secondary nucleus (vegetative fertilization)to form endosperm.
    - Occurrence of two fertilization is called double fertilization

Post fertilization changes occur in the flower of angiosperms.

Sepals, petals, stamens, styles and stigma fall off

Persistanat calyx is seen in Solanaceae

Persistent calyx in asteraceae is called **Pappus** helps in seed dispersal

Ovary store food material and develops in to fruit

Fertilized ovule develops in to seed

Funiculus	salk of the seed
Outer integument	Testa (outer seed coat)
Inner integument	tegmen(inner seed coat)
Micropyle	seed pore
Zygote	Embryo
Synergids	Degenerate
Antipodals	degenerate
Primary Endosperm nucleus	Endosperm
Hilum	scar of the seed

Endosperm formation is suppressed in Orchidaceae and podostemonaceae

Endosperm;

- Post fertilization product of primary endosperm nucleus is called endosperm
- Endosperm is a nutritive tissue useful for developing embryo
- It is triploid (3n) in condition
- In gymnosperm endosperm formed before fertilization and hence it is Haploid (n)
- If endosperm is utilized completely by the time of seed formation they are called **non-endospermic seed** or ex albuminous seed eg; Dolichos, Cicer and Capsella
- If a little endosperm is left over then they are called **Endospermic seeds** or albuminous seeds Eg: Cocos, Ricinus, Datura
- The left over nucellus is called **Perisperm.** It is perticulary developed in non endo spermic seed.seeds of piper nigrum, Nymphaeaceae.
- Edible part of coffee seed is persperm
- The circular or annular integument like out growth developed from the funiculus or hilum of a fertilized ovule is called **Aril Eg; Pithecalobium, Myristica fragrans**
- The sponge like out growth arises from the integumetary cells at the micropylar regions is called **Caruncle.** This helps in absorption of water during germination Eg: Ricinus,
- Ovule after fertilization froms in to seed
- Seed made up of seed coat and embryo

- Embryo made up of a radical, aplumule, embryonal axis and 1 or 2 cotyledons
- Developing seeds are attached to the fruit through Hilum
- The embryonal axis on seed is called tigellum
- Cotyledons hinged at the emryonal axis called cotyledonary node
- The region of the embryonal axis between radical and point of cotyledon attachment is **hypocotyls**
- Where as Plumule and cotyledon is called **epicotyls**
- In monocots the outer covering of endosperm separating embryo is a protein layer called **Aleurone layer.**
- The plumule and cotyledons in monocots are enclosed by **coleoptiles and coleorhizae**
- Region between cotyledonary node and base of coleoptiles is **mesocotyl**
- Cotyledons emerge out of the soil is epigeal germination eg: Dolichos, cucurbita
- Cotyledon remains in seed below the ground called hypogeal germination Eg: Maize, Pea
- Germination of the seed which occurs inside the fruit while it is still attached to the parent plant is called Vivipary germination or aerial germination

Eg; rhizophora.