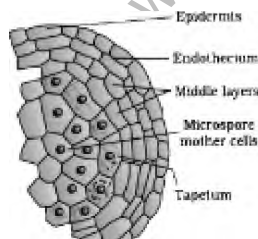


SEXUAL REPRODUCTION IN FLOWERING PLANTS

Reproduction is the means of perpetuation of race as the older individuals undergo senescence and die. Flowering plants show sexual mode of reproduction and bear complex reproductive units as male and female reproductive units along with accessory structures.

Pre-fertilization Structure and Rivas

- Several structural and hormonal changes lead to formation and development of the floral primordium. Inflorescence is formed that bears floral buds and then flower.
- In flowers, male androecium and female gynoecium differentiate and develop in which male and female gametes are produced.
- * Stamen consists of long and slender stalk called filament and generally bilobed anther. Each lobe contains two theca (ditheca).
- The anther is four-sided structure consisting of four microsporangia, two in each lobe.
- Microsporangia develop further and become pollen sacs which contain pollen grains.
- Microsporangium is generally surrounded by four layered walls: the epidermis, endothecium, middle layer and tapetum. Innermost layer tapetum nourishes the developing pollen grains.
- Sporogenous tissues are present in the middle of microsporangium.
- Microsporogenesis - is the process of formation of microspores from a pollen mother cell through meiotic division.
- The cells of sporogenous tissues undergo meiotic division to form microspore tetrad. As the anther matures and dehydrates, the microspore dissociates and develops into pollen grains.



- The pollen grain represents the male gametophyte. Each pollen grain has a two-layered wall, the outer nine-layered wall is called the exine, made up of sporopollenin, and the inner one-layered wall is called the intine, made up of cellulose and pectin.
- A pollen grain's exine has a prominent aperture called germ pores. Pollen grains contain two cells: the vegetative cell and the generative cell.
- In most of the angiosperms, pollen grains are shed in a 2-celled stage.

The Pistil, Megasporangium (Ovary) and Embryo sac

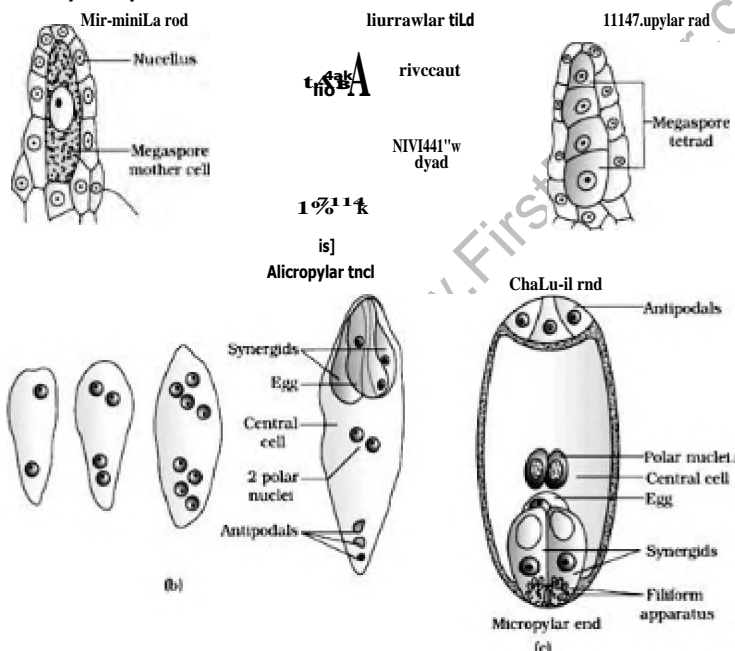
- Gynodium may consist of single pistil (monocarpellary) or more than one pistil (polycarpellary) which may be fused (syncarpous) or free (apocarpous).
- Each pistil has three parts: the stigma, style, and ovary. Inside the ovary is the ovarian cavity (locule). The placenta is located inside the ovarian cavity. Megasporangia (ovules) arise from the placenta.

The Megasporangium (ovule) is a small structure attached to the placenta by means of a stalk called the funiculus.

Embryogenesis - is the process of formation of megaspores from the megaspore mother cell.

- Ovule differentiates a single megaspore mother cell (PM) in the micropylar region of the nucellus. PM undergoes meiotic division that results in the production of four megaspores.

- In most of the flowering plants three megaspores degenerate_ 1 megaspore develops into female gametophyte.
- The nucleus of functional megaspore divides mitotically to form two nuclei which move to opposite poles to form 2-nucleate embryo sac. Two more sequential mitotic divisions result into 8-nucleate embryo sac.
- Six of the eight nuclei (surrounded by cell wall and remaining two nuclei polar nuclei) are situated below the egg apparatus.
- Three cells are grouped at micropylar end to constitute egg apparatus and three cells at chalazal end form antipodal cells. At maturity embryo sac is 8-nucleate and 7-celled.



Pollination - Is transfer of pollen grains from anther to stigma..

- Autogamy - transfer of pollen grain from anther to stigma of same flower. Types are as follows!
 - Chasmogamous - flower which do not open.
 - Cleistogamous - exposed anther and stigma.
- Geitonogamy - transfer of pollen grains from anther to stigma of different flower of same plant.
- Xenogamy - transfer of pollen grain from anther to stigma of different plant's flower of same species.

Agents of pollination includes a biotic (water.. wind) and biotic factors, butterfly, honey bee etc.

MAI: Heading Devices - the various mechanisms that discourage self-pollination and encourage cross pollination as

COW: In self-pollination leads to inbreeding depression. It includes

- Pollen release and stigma receptivity not synchronized.
- Anther and stigma are placed at different position.
- inhibiting pollen germination in pistil
- Production of unisexual flowers.

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Pollen pistil interaction— the pistil has ability to recognize the compatible pollen to initiate post pollination events that leads to fertilization. Pollen grain produce pollen tube through germ pores to facilitate transfer of male gametes to embryo sac.

Double Fertilization- after entering the egg chamber, each pollen grain releases two male gametes, One male gametes fuse with egg (syngamy) and other male gametes fuse with two polar nuclei (triple fusion) to produce triploid primary endosperm nucleus (PEN)

Since two types of fusion takes place in an embryo sac the phenomenon is called double fertilization. The PEN develops into the endosperm and zygote develops into embryo.

Post fertilization events include endosperm and embryo development, maturation of ovule into seed and ovary into fruits.

Endosperm- the primary endosperm cell divides many times to form triploid endosperm tissue having reserve food materials. In coconut, white nuclear endosperm and white kernel is the cellular endosperm.

The wall of ovary develops into wall of fruit called pericarp. In true fruits only ovary contributes in fruit formation but in false fruit thalamus also contributes in fruit formation.

- **Apomixis** – formation of seeds without fertilization.
- **Polyembryony**- occurrence of more than one embryo in a seed.