

-Lab-2

Reproduction in plant

Plant breeders need to understand the reproductive systems of plants for the following:

- 1-The genetic structure of plants depends on their mode of reproduction.
- 2-In flowering species, artificial hybridization is needed to conduct genetic studies to understand the inheritance of traits of interest, and for transfer of genes of interest from one parent to another
- 3-Artificial hybridization requires an effective control of pollination so that only the desired pollen is allowed to be involved in the cross.
- 4-The mode of reproduction also determines the procedures for multiplication and maintenance of cultivars developed by plant breeders.

Sexual reproduction

Sexual life cycle of a plant (alternation of generations)

A flowering plant goes through two basic growth phases:

1-vegetative phase

In the vegetative phase, the plant produces vegetative Growth only (stem, branches, leaves, etc.).

2- Reproductive phase

In the reproductive phase , flowers are produced . In order for sexual reproduction to occur, two processes must occur in sexually reproducing species.

a- The first process, meiosis, reduces the chromosome number of the diploid ($2n$) cell to the haploid (n) number. First phase or generation, called the **gametophyte generation**, begins with a haploid spore produced by meiosis.

b- The second process, **fertilization**, unites the nuclei of two gametes, each with the haploid number of chromosomes, to form a diploid **sporophyte generation** phase.

In some species, exposure to a certain environmental factor (e.g., temperature, photoperiod) is required to switch from the vegetative to reproductive phase.

Duration of plant growth cycles

1-Annuals

Annual plants (or annuals) complete their life cycle in one growing season .ex:(corn, wheat)

2- Biennials

A biennial completes its life cycle in two growing seasons ex sugar beet grows vegetatively in the first season. In winter, it becomes vernalized and starts reproductive growth in spring.

3-Perennials

Perennials are plants that have the ability to repeat their life cycles indefinitely by circumventing the death stage. (Grape, orange).

4-Monocarps

Monocarps are characterized by repeated, long vegetative Cycles that may go on for many years without entering the reproductive phase ex: bromeliads.

Structure of the flower

the plant breeder should be familiar with the flower structure, regarding the parts and their arrangement Four major parts of a flower are generally recognized:

A-petal or **corolla**. The showiest parts of the flower.

B-sepal or **calyx** (leaf like structures that enclose the flower in its bud stage).

C- Stamen or **androecium** (filament, anther).

D- Pistil or **gynoecium** (stigma, style and ovary).

Types of flowers

a-Complete flower flower has all the four major parts (tomato, cotton)

b-Incomplete flower. flower lacks certain parts (often petals or sepals) ex: (rice, corn, wheat).

c-Perfect flower When both stamens and a pistil occur in the same flower (tomato).

d-Imperfect flowers **1-staminate flowers** **2-pistillate flower.**

Gametogenesis

Sexual reproduction entails the transfer of gametes to specific female structures where they unite and are then transformed into an embryo, a miniature plant. Gametes are formed by the process of gametogenesis.

They are produced from specialized diploid cells called **microspore mother cells** in anthers and **megaspore mother cells** in the ovary. Microspores derived from the mother cells are haploid cells each dividing by mitosis to produce an immature **male gametophyte** (pollen grain). Most pollen is shed in the two cell stage, even though sometimes, as in grasses, one of the cells later divides again to produce two sperm cells. In the ovule, four megaspores are similarly produced by meiosis. The nucleus of the functional megaspore divides three times by mitosis to produce eight nuclei, one of which eventually becomes the egg. The **female gametophyte** is the seven-celled, eight-nucleate structure. This structure is also called the **embryo sac**. Two free nuclei remain in the sac. These are called polar nuclei because they originate from opposite ends of the embryo sac.

Helplines in sexual reproduction in plant:

1-wind 2-Animals 3-Human 4-Insects 5-water current

