Reproduction in Plants

Reproduction-It is the ability of living organisms to produce new individuals.

- Two modes of reproduction

1. **Asexual reproduction –** New plants are formed without seeds or spores.
2. **Sexual reproduction –** New plants are obtained from seeds.

Different Modes of Asexual reproduction

1. Vegetative propagation- It is the ability of a plant to produce new plants asexually from vegetative parts like roots, stem, leaves, and buds.

- **Stem propagation:** Example-Rose
- **Propagation by leaf**: Example- *Bryophyllum*
- **Propagation by roots**: Example- Sweet potato

Stem propagation -- The surface of potato has several buds called eyes that develop into new plants.

Propagation by leaf – The leaves of ***Bryophyllum*** have several buds at their margins that develop into tiny plants.

Propagation by roots – The roots of sweet potato, *Dahlia* get detached from parent plant and give rise to a new plant.

Sugarcane, rose, money plant, etc. reproduce by stem cutting.

Advantages of vegetative propagation

i. Method of propagation for seedless plants.
ii. Exact copies of parent plant are produced.
iii. Large numbers of offsprings are produced.
iv. Disease free plants can be propagated.

2. Budding

- Involves formation of a bulb-like projections called bud, from the main parent body.
- This bud gradually grows and get detached from the parent cell thereby forming a new individual.
- For example- yeast.

3. Fragmentation

- It is a form of asexual reproduction where new individuals are formed from the fragments of parent body.
- For example- *Spirogyra*.

4. Spore formation

- Spores are asexual reproductive bodies which can germinate into a complete individual on onset of favourable conditions.
- For example- ferns

Sexual reproduction in plants

- A plant reproduces sexually with the help of flowers.
- Stamen and pistil are the reproductive parts of a flower.
- Stamen is the male reproductive part and pistil is the female reproductive part.
- Bisexual flowers have both stamen and pistil. Examples – Lily, rose, *Hibiscus*, mustard, *Petunia*, etc.
- Unisexual flowers have either stamen or pistil. Examples – Corn, papaya, cucumber, etc.
- Stamen is the male reproductive part and consists of filament and anther.

1. Anther produces numerous pollen grains.
2. Pollen grains contain male gametes.

- Pistil is the female reproductive part and consists of stigma, style, and ovary.

1. Ovary contains one or more ovules.
2. Ovules contain egg cell called female gamete.

After Fertilization,

- Fertilized ovule forms seed.
- Floral parts such as sepals, petals, stamens, style, and stigma fall off.
- Ovary grows, enlarges, and ripens to become fruit.
- Fruits can be fleshy and juicy (examples – apples, mangoes) or dry and hard (example − nuts or peas).

Fruit – Fruit is the mature ovary.

- It has two main parts pericarp (It further contains outer hard epicarp, fleshy, edible mesocarp and innermost endocarp).
- Endocarp is the part that covers the seed.
- Fruit helps to protect the plant from animals or extreme climatic conditions.
- It also helps in seed dispersal and performs the function of storage of food.

Seed – Seed is the mature ovule.

- Outer covering of seed is called seed coat.
- A seed is made up of one or two cotyledons and a seed axis.
- Plumule of the axis develops into shoot and radicle into root.
- Under proper conditions seed germinates to form a new plant.

Seed dispersal

- Distribution of seeds to new places is known as seed dispersal.

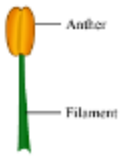
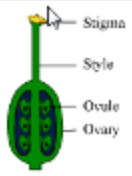
Importance of seed dispersal

- Reduces competition between plant and plant seedlings
- Helps plant in inhabiting a new suitable habitat
- Prevents overcrowding

The process of seed dispersal is fulfilled with the help of many external agents like animals, wind, water, etc.

Sexual Reproduction in Plants
The flowers are the reproductive structures of a plant. The male reproductive part of a flower is known as the stamen, while the female reproductive part of a flower is known as the pistil.
Types of Flowers
Unisexual flowers-The flowers which contain only the male reproductive part, i.e stamen. For example, corn, cucumber
Bisexual flowers- The flowers which contain only the female reproductive part, i.e pistil. For example, mustard, rose

Structure of a stamen and pistil

Stamen	Pistil
	
The stamen consists of an anther and a filament. The anther contains pollen grains and produces the male gametes.	The pistil consists of the stigma, style, and ovary. An ovary contains ovules. The fe egg is produced inside the ovule.

Pollination – It is the process of transfer of pollen from anther to stigma.
Self Pollination

- Pollens are transferred from stamen to pistil of the same flower of the same plant.
- It occurs within same flowers (bisexual).

Cross Pollination

- Pollens are transferred from stamen of one flower of a plant to stigma of another flower of same plant or that of a different plant of the same kind.
- It occurs in both unisexual and bisexual flowers.
- Pollens are transferred from one flower to another with the help of insects, birds, wind or water.

Fertilisation: It is the process of fusion of male and female gametes to produce a zygote.

After fertilisation, the ovary matures into the fruit and the ovule matures into the seed.

- **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.*