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Ch-5 Pollination and Fertilization

Notes:

Pollination: It is the transfer of pollen grains from the anther to the stigma of the same flower or another flower of the same ~~flower~~ species.

It is an essential process for sexual reproduction in flowering plants and is the first step towards fertilization.

Pollination is of 2 main types: self-pollination and cross-pollination.

Ways of pollination:

- **Autogamy:** It is the transfer of pollen grains from the anther to the stigma of the same flower.
- **Geitonogamy:** It is the transfer of pollen grains from the anther of one flower to the stigma of another flower on the same plant.
- **Allogamy:** It is the transfer of pollen grains from the anther of one flower to the stigma of another flower on a different plant of the same species.

Self Pollination: It is the transfer of pollen grains from the anther of a flower to the stigma of the same ~~flower~~ flower or another flower on the same plant.

Self-Pollination:

In some plants, self-pollination is ensured by cleistogamy, in which flowers do not open. Cleistogamy is an adaptation that guarantees self-pollination.

Advantages of Self-pollination:

- Pollination is assured.
- There is no wastage of pollen grains.
- No energy is spent on producing showy petals, scent or nectar.
- Parental characters are retained.

Disadvantages of Self-pollination:

- Weakening of species occurs due to inbreeding.
- No new varieties are formed.
- Anthers and stigma must mature at the same time.

Cross-pollination: It is the transfer of pollen grains from the anther of a flower on one plant to the stigma of a flower on another plant of the same species.

Advantages of cross-pollination:

- Healthier and more vigorous offspring are produced.
- New varieties are formed.
- Plants spread to far-off places.
- Healthy seeds are produced in large numbers.

Disadvantages:
• It is energy consuming.
• It is a waste of energy.
• It is a waste of space.

- (i) Unisexuality
- (ii) Dichogamy
- (a) Stigma
- (b) Anther
- (iii) Self-pollination
- (iv) Cross-pollination
- (v) Heterostyly

Disadvantages of cross-pollination:

- It depends on pollinating agents.
- Energy has to be spent on producing the large amount of pollen and showy flowers.
- It is not an economical phenomenon for plants.

Conditions favouring cross-pollination:

Unisexuality: Male and female flowers are separate due to which self-pollination is prevented

ixicogamy: Androecium (anthers) and gynoecium (stigma) mature at different times.

Protandry: Anthers ~~and~~ mature earlier than stigma of the same flower. Examples: Sunflower, Salvia.

Protogamy: Pistils mature earlier than stigma of the same flower. Examples: Peepal, Mustard

Self-sterility: Pollen grains fail to grow on the stigma of the same flower due to mutual inhibition. Examples: Orchid, Sunflower.

Herkogamy: Physical barrier exists between anther and stigma. Example: hood in Salpiglossis.

Heterostyly: Flowers have different height of the styles and stamens. This is the condition of occurrence of two or more than two types of flowers which have different length of styles and stamens. Eg: Example: Oxalis, Primrose.

(i) why

(ii) breeding

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Agents of Cross-Pollination:

- (i) **Agents of Cross-Pollination (Entomophily):** Flowers pollinated by this type of pollination have large brightly coloured, scented, produce nectar, have sticky pollen grains and stigma and are in clusters. Example: *Bahia*, *Sweet pea*.
- (ii) **Wind-pollination (Anemophily):** Flowers pollinated by this type of pollination are small, dull, not produce scent or nectar. Their stamens are long and hanging and anthers are large and loosely attached. Pollen grains are light, dry, smooth and large in quantity. The stigmas are feathery and hanging out. Example: *Maize*.
- (iii) **Water-pollination (Hydrophilous):** Flowers pollinated by this type of pollination have large number of pollen grains, mostly floating below the surface of water. In *Utricularia*, the male flowers float on the surface of water till they meet female flowers.
- (iv) **Bird-pollination (Ornithophily):** In this type of pollination flowers are tubular or cup-shaped and produce large quantity of nectar. They are brightly coloured to attract birds from long distances. Example: *Gamma*, *Bigonia*.
- (v) **Elephantophilous:** In this type of pollination flowers are pollinated by elephants. Example: *Happusia*.

Artificial - pollen to pollinate
Emasculated
bisexual
Fertilization
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Artificial-pollination. When man himself transfers pollen to the stigma, it is called artificial pollination.

Emasculation: The removal of anthers in a bisexual flower to prevent self-pollination.

Fertilization:

After pollination, the pollen grain germinates on the stigma and forms a pollen tube that grows through the style to the ovary, enters the ovule through the micropyle, and releases 2 male gametes.

Fertilization is the fusion of the male gamete present in pollen with the ~~male~~ female gamete present in the ovule to form a zygote, which is also called an oospore.

Double fertilization: It is a characteristic feature of flowering plants.

In this process, out of the two sperm nuclei, one sperm nucleus fuses with the egg nucleus to form an embryo process is called syngamy.

The another sperm fuses with the centrically placed two polar nuclei to form an endosperm process is called triple fusion.

As there are 2 kinds of fusion - syngamy and triple fusion - take place, the process is known as double fertilization.

Fate of floral parts after fertilization:

- Ovary ~~to~~ into fruit.

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- Ovary into seed.
- Integuments into seed coat.
- The wall of the ovary into the wall of the fruit.
- Endosperm nucleus into nutritive tissue for the growing embryo.
- The sepals petals, stigma, style and ovary into may dry up and fall off.
- Sepals into persist as small leaf-like structures near the stalk of the fruit or might fall off.

Some Key Terms:

- Pollen tube: The pollen tube grows through the stigma and style by dissolving the tissues with the help of enzymes to reach the ovary.
- Parthenocarpy: It is the formation of a seedless fruit.
- Polyembryony: Formation of more than one embryos.
- Parthenogenesis: Formation of new individual from a single gamete without fertilization.

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