Quadrant II – Notes

Programme: Bachelor of Science (Second Year)

Subject: Botany

Course Code: BOC 103

Course Title: Plant Anatomy and Embryology

Unit: 06 (Pollination and Fertilization)

Module Name: Pollination Mechanisms and Adaptations

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Introduction

Pollination is defined as the process of pollen transfer from anther to stigma of a flower. The pollen grains are formed in the pollen sacs which are completely enclosed by multi-layered anther wall. Therefore, for pollination to occur, the pollen grains have to be released from the anther. Anther dehiscence is the release of the pollen grains from the anther chamber / pollen sacs. It is necessary for male fertility of the flowers. Anthers that have viable pollens but fail to dehiscence are as good as sterile anthers.

Types of Pollination

1. Self-pollination

It is also known as autogamy. In this type of pollination the pollen grains are transferred from an anther to the stigma of the same flower. Possible only in those plants which bear bisexual flowers. Anther dehiscence and receptivity of stigma occur simultaneously.

2. Cross-pollination

Pollen grains are transferred from an anther to the stigma of another flower. Cross-pollination is further divided into two types i.e Geitonogamy and Xenogamy. Geitonogamy is the transfer of pollen grains from anther of a flower to the stigma of another flower on the same plant. It functions like a cross-pollination but similar to autogamy genetically. In Xenogamy, pollination occurs between two flowers on different plants. In this case, genetic variation is observed.

Floral Mechanisms Favouring Cross-Pollination

Flowers which are unisexual, cross-pollination is very essential.

However, in certain plants with bisexual flowers, self- pollination is prevented through the following ways:

1. Self-sterility

This happens when there is inability of the pollen to germinate on its own stigma, failure of fertilization or the flower is self-sterile or self-incompatible. For example, in *Petunia axillaris*, growth of the pollen tubes formed upon self-pollination is inhibited in the mid-part of the style.

2. Dichogamy

This refers to maturation of male and female reproductive organs at different times. Protandry is the condition wherein the anthers dehisce much before the stigma of the same flower attains receptivity whereas protogyny is a condition when the stigma loses receptivity by the time the anthers dehisce.

3. Herkogamy

In some bisexual flowers the structure of the male and female reproductive organs itself proves a barrier to self-pollination. In certain flowers the stigma projects beyond the stamens so that the pollen do not fall on it.

4. Heterostyly

The flowers may be of two or more types with regards to mainly length of the style and length of the stamens. Pollen from a flower can bring about effective pollination in flowers of a different type and not within its own type.

Pollination Agencies

The various agencies helpful in cross-pollination are classified into two categories namely abiotic and biotic agencies. The abiotic agencies include non living agents such as wind and water. The biotic agencies include living organisms such as birds, bats, insects etc.

1. Anemophily

This refers to wind pollination. The flowers are small and inconspicuous and perianth lobes are reduced or absent. Large quantities of pollen grains are produced. The pollen grains are small, light, smooth and dry so that they can be carried by wind to long distance. The stigma should be large and feathery or brush-like and projects beyond the floral envelopes so that the pollen grains can get trapped.

2. Hydrophily

This refers to water pollination. In this case, floral envelopes are highly reduced. Hydrophily is of two types i.e Hyphydrophily, wherein pollination takes place inside water and Ephydrophily wherein pollination takes place outside water.

3. Ornithophily

This refers to pollination brought about by birds. Flowers are tubular, cup-shaped or urn-shaped. Flowers are brightly coloured. Large quantities of pollen as well as are plenty of nectar are produced. The pistils and stamens project beyond the floral envelopes.

4. Cheiroptherophily

This refers to pollination brought about by bats. Flowers are dull in colour and open only at or after dusk. When the flowers bloom, they emit a strong odour which has been described as musty or resembling sour milk. Produces large quantities of nectar.

5. Entomophily

This refers to pollination brought about by insects. Some of the insects which help in pollination are bees, flies, wasps, moths and beetles. Bees are colour-blind for red and are fond of yellow, violet and purple. They visit flowers to collect their food (pollen and nectar) and in the process prove instrumental in bringing about pollination.