

POLLEN-PISTIL INTERACTION (NCERT notes)

The events from the deposition of pollen on the stigma till the entry of pollen-tube into the ovule are collectively called **pollen pistil interaction**. It is an essential step in fertilization of angiosperm and determine compatibility and incompatibility of pollen and pistil. **It includes following steps-----**

Recognition of compatible pollen

- Pollination does not guarantee the transfer of the right type of pollen (compatible pollen of the same species as the stigma). Often, pollen of the wrong type, either from other species or from the same plant (if it is self-incompatible), also land on the stigma.
- **The pistil has the ability to recognize the pollen, whether it is of the right type (compatible) or of the wrong type (incompatible).**
- If it is of the right type, the pistil accepts the pollen and promotes post-pollination events that leads to fertilization. If the pollen is of the wrong type, the pistil rejects the pollen by preventing pollen germination on the stigma or the pollen tube growth in the style.
- **The ability of the pistil to recognize the pollen followed by its acceptance or rejection is the result of a continuous dialogue between pollen grain and the pistil. This dialogue is mediated by chemical components of the pollen interacting with those of the pistil.**

Growth of the pollen tube

- Following compatible pollination, the pollen grain germinates on the stigma to produce a pollen tube **through one of the germ pores**. The contents of the pollen grain move into the pollen tube.
- Pollen tube grows **through the tissues of the stigma and style** and reaches the ovary.
- You would recall that **in some plants, pollen grains are shed at two-celled condition (a vegetative cell and a generative cell). In such plants, the generative cell divides and forms the two male gametes during the growth of pollen tube in the stigma.** In plants which shed pollen in the three-celled condition, pollen tubes carry the two male gametes from the beginning.

Entry of pollen tube into the ovules

Pollen tube, after reaching the ovary, enters the ovule through -----**the micropyle and then enters one of the synergids through the filiform apparatus.** Many recent studies have shown that filiform apparatus present at the micropylar part of the synergids guides the entry of pollen tube.

All these events—from pollen deposition on the stigma until pollen tubes enter the ovule—are **together referred to as pollen-pistil interaction**. As pointed out earlier, pollen-pistil interaction is a dynamic process involving pollen recognition followed by promotion or inhibition of the pollen.

some information about-----importance of interspecific and intergeneric hybridization(crossing of 2 species from the same genus and mating between two different genera respectively) in plant breeding technique

- The knowledge gained in this area would help the plant breeder in manipulating pollen-pistil interaction, even in incompatible pollinations, to get desired hybrids.

- You can easily study pollen germination by dusting some pollen from flowers such as pea, chickpea, *Crotalaria*, balsam and *Vinca* on a glass slide containing a drop of sugar solution (about 10 per cent). After about 15–30 minutes, observe the slide under the low power lens of the microscope. You are likely to see pollen tubes coming out of the pollen grains.
- As you shall learn in the chapter on plant breeding (Chapter 9), **a breeder is interested in crossing different species and often genera to combine desirable characters to produce commercially 'superior' varieties.**

ARTIFICIAL HYBRIDIZATION

Artificial hybridization is **one of the major approaches of crop improvement programme.** It is the crossing of different species and often genera to combine desired character to produce commercially superior variety.

In such crossing experiments it is important to make sure that only the desired pollen grains are used for pollination and the stigma is protected from contamination (from unwanted pollen). **This is achieved by emasculation and bagging techniques.**

Emasculation- If the female parent bears bisexual flowers, removal of anthers from the flower bud before the anther dehisces using a pair of forceps is necessary. This step is referred to as emasculation.



Bagging- Emasculated flowers have to be covered with a bag of suitable size, generally made up of butter paper, to prevent contamination of its stigma with unwanted pollen. This process is called bagging.



When the stigma of bagged flower attains receptivity, mature pollen grains collected from anthers of the male parent are dusted on the stigma,



and the flowers are rebagged, and the fruits allowed to develop.

Note- If the female parent produces unisexual flowers, there is no need for emasculation. The female flower buds are bagged before the flowers open. When the stigma become receptive, pollination is carried out using the desired pollen and the flower rebagged.