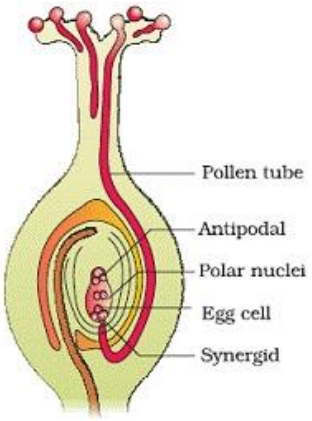
Outbreeding Devices– the various mechanisms take discourage self-pollination and encourage cross pollination as continued self-pollination leads to inbreeding depression. It includes

- Pollen release and stigma receptivity not synchronized.
- Anther and stigma are placed at different position.
- Self-Incompatibility-genetic mechanism Inhibiting pollen germination in pistil of same plant.
- **Production of unisexual flowers in monoecious plants prevent Autogamy but not Geitonogamy** ex-castor and maize.
- **Dioecy- Male and female flower on separate plant. Ex: Papaya**



Pollen pistil interaction

– the pistil has ability to recognize the compatible pollen to initiate post pollination events that leads to fertilisation.

In over **60 % angiosperms**, **pollen grains are shed 2-celled stage** (Vegetative & Generative Cell) in which the generative cell divides and **forms the two male gametes during the growth of pollen tube in the stigma.**

In rest **40% angiosperms**, pollen tube carries **two male gametes from beginning** only.

Double Fertilisation

Pollen Land on **Stigma** → Pollen Tube grows through **Style** → Enters Ovule through **Micropylar End**

Two Male Gametes Enter **Synergids through the filiform apparatus**

- **1st Male Gamete Fuses with Egg Cell & forms Zygote** → **Syngamy**
- **2nd Male Gamete fuses with Two Polar Nuclei & forms Endosperm (PEN)** → **Triple Fusion**

Since, two types of fusions, syngamy and triple fusion take place in an embryo sac the phenomenon is termed **Double Fertilisation** (unique feature of Angiosperms).

Zygote (2n) develops to Embryo by Mitotic division.

Primary **Endosperm** Nucleus **(PEN) (3n)** develops to Primary Endosperm Cell **(PEC)** by free nuclear division (mitosis) followed by cytoplasmic division.

Ex: Coconut Water(PEN).

Artificial Hybridization

- Crossing different varieties of species- hybrid individual- with desirable characters of the parent plants.
- Take desired pollen grains for pollination-
- Protected Stigma from contamination by Bagging
- **Emasculation :** Removal of anther (**Needed in bisexual flowers only**)
- **Bagging :** flower covered by a small size bag made up of butter-paper prevents contamination of stigma from unwanted pollen.
- Bagged flower are dusted with mature pollen grains and rebagged- fruits allowed to develop.