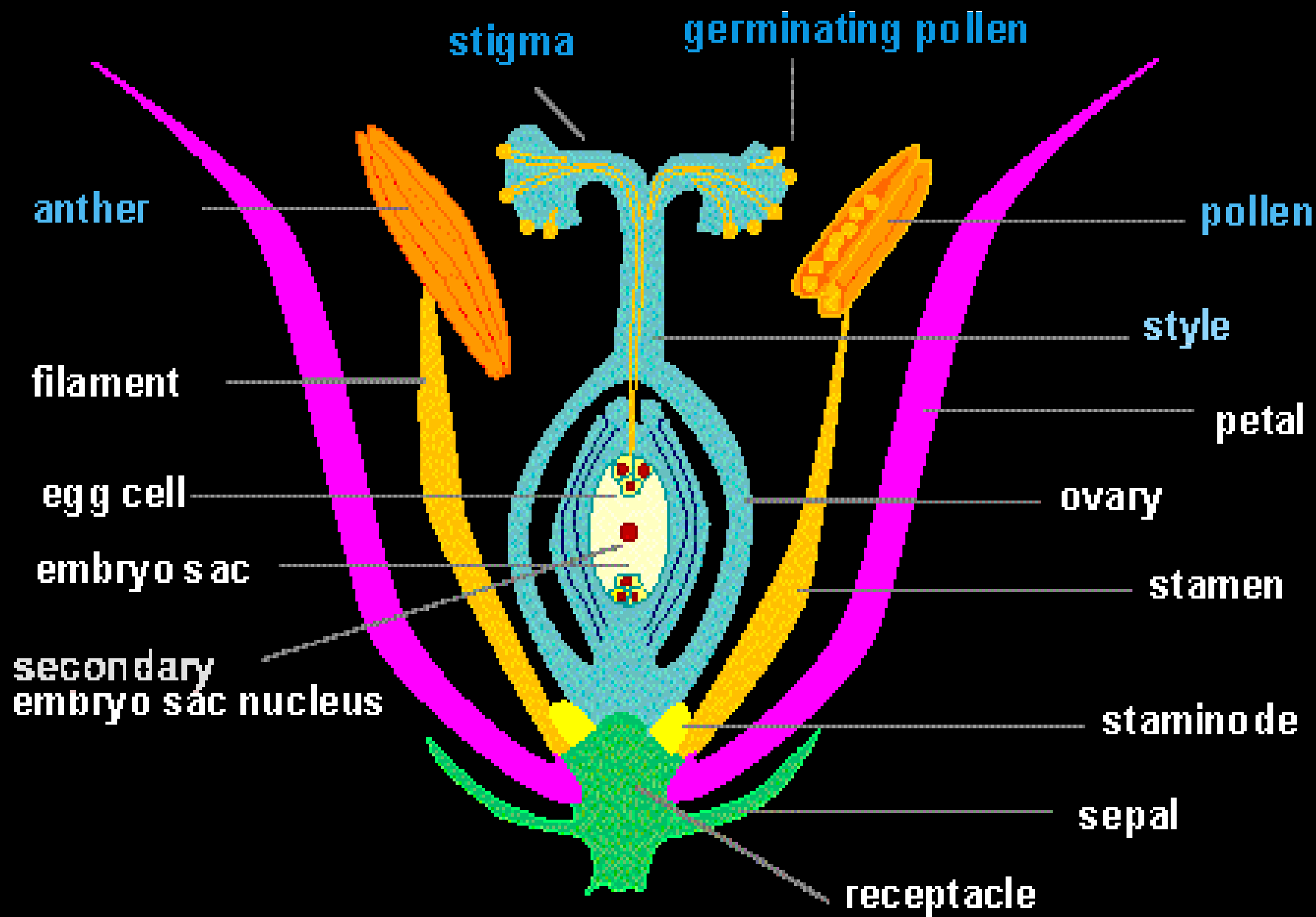


Floral Biology of Vegetables

Floral Biology

- * Floral biology is the study of the science of flowers, which includes opening of flowers- anthesis of flowers, dehiscence of anthers, pollen viability and stigma receptivity.
- * It is an essential and basic requirement in breeding program of the vegetables, especially in case of hybrid seed production.



Important terminology in Floral Biology

- **Inflorescence**

A flowering system consisting of more than one flowers.

- * **Monoecious**

Unisexual flower where male and female flowers are present on the same plant separately e.g. cucurbit, sweet corn.

- * **Dioecious**

Male and female flowers are present on different plants e.g. spinach, asparagus.

- * **Gynoecious**

Only female flowers/plants are present in the population which need to produce are bear more fruits per plant. The frequency of femaleness varies in each vegetable variety e.g. cucumber, luffa.

- * **Hermaphrodite**

Flowers having both female and male structures.

- * **Perfect Flower**

Flowers having all the 4 floral parts (sepals, petals, stamen and carpals)

Continue.....

- * **Andromonoecious**

Male plants bearing only male flowers e.g. cucurbits especially muskmelon.

- * **Gynomonoecious**

Plant bearing only female parts e.g. cucumber.

- * **Dichogamy**

Maturation of stigma and anther at different time.

- * **Homogamy**

Maturation of stigma and anther at same time.

- * **Protogyny**

Maturation of stigma ahead of anther e.g. brassica spp.

- * **Protoandry**

maturation of anther ahead of stigma e.g. carrot and onion.

- * **Heterostyly**

Different lengths of the style and stigma making self-pollination impossible.

Continue.....

- * **Homostyly**

Having both stamens and styles of same length.

- * **Cleistogamy**

The production of flower that do not open to expose the reproductive organs. These are self-pollinated vegetables e.g. lettuce.

- * **Chasmogamy**

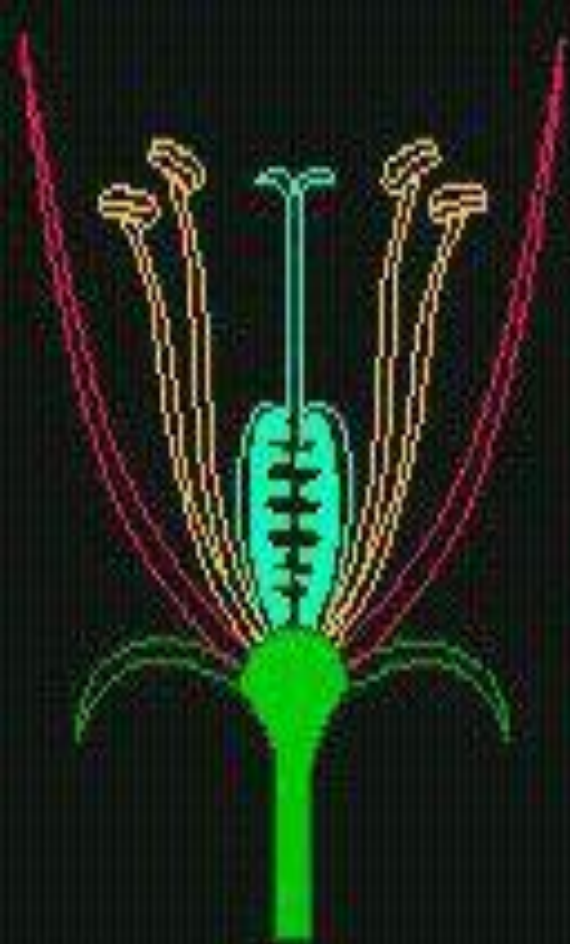
The condition in which Pollination occur after the opening of the flowers. These are mostly cross-pollinated vegetables e.g. Capsicum, Brinjal, Tomato etc.

- * **Epigynous**

Enlargement of floral parts in which stamens, sepals and petals are inserted above the ovary giving and inferior ovary.

- * **Hypogynous**

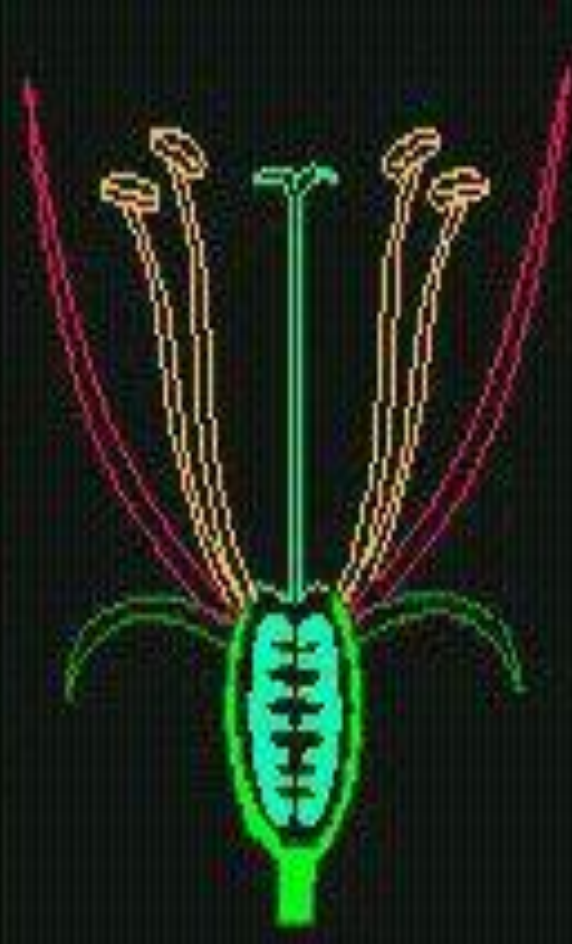
Floral parts are inserted below the gynoecium and free from it.



hypogynous



perigynous



epigynous

flower

Floral Biology includes.....

1. Morphology
2. Anthesis
3. Dehiscence

1- Morphology

➤ **Bud Formation**

The bud is an embryonic or un-elongated shoot which develops into a flower which produces the reproductive part.

➤ **Flower Structure**

It matters about pollen size, pollen transfer organs, style length, stigma surface, petal and sepal size, nectars.

➤ **Flower parts and their functions**

Normal flower opening signals, maturity of reproductive organs. Mature stamens shed their pollen grains. Mature pistil becomes receptive and is coated with sugary syrup to capture the pollens. Style length also plays an important role in pollen spreading and pollination.

➤ **Pollination insects**

Insects which help in transfer of pollens from stigma to pistil to help cross pollination.

➤ **Wind, Water and Animals**

They also help in transfer of pollens from one area to another distant area.

2- Anthesis

- Opening of Floral Buds
- Time of Fertilization

3- Dehiscence

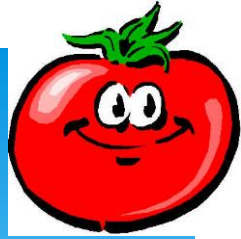
- **Release of Pollen after its maturity** (usually occur with in few hours after the unfolding of the petals, depending upon rainfall, temperature and humidity)

Factors Effecting Floral Biology

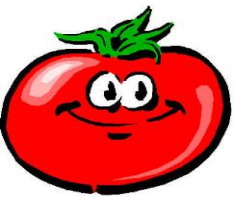
1. Temperature
2. Light
3. Humidity
4. Genetic factors



Floral Biology of Tomato



- * Inflorescence of the extra-axillary cymes. It may be terminal or continuous with vegetative shoot.
- * No. of flowers per cluster = 3 to several.
- * Flower Colour = Bright Yellow
- * Flowers are bi-sexual, complete and hypogynous.
- * Pistil has 2 to several carpals.
- * Style is shorter having anthers in a cone.



Continue.....

- * The anthesis start in morning 6 AM with maximum flowers opened in late morning.
- * Maximum anther dehiscence take place from 8 AM to 11 Am.
- * Stigma receptivity is 5 days after anthesis.
- * Pollen grain germination takes place 2 hours after pollen applied on stigma.
- * Pollen can be stored up to 3 days.
- * Optimum temperature for pollen germination = 18-25 C

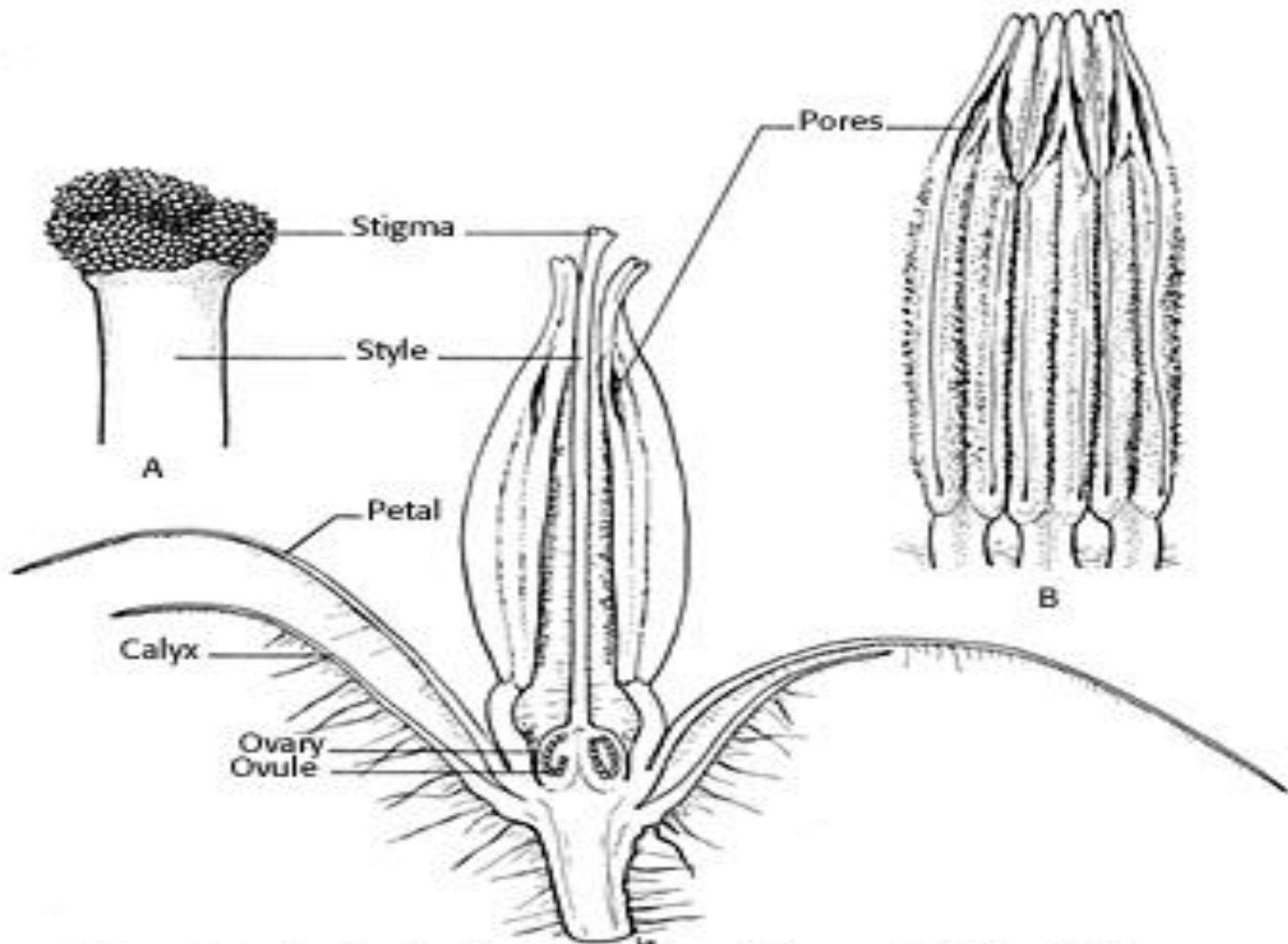


Figure 184. - Longitudinal section of tomato flower, x9. A, Tip of pistil; B, three anthers, greatly enlarged.



Tomato Bud



Tomato Flower



Floral Biology of Chilli



- * Flowering takes place after 1-2 months after planting.
- * Flower opening takes place in the morning at 6 AM to 10 AM. During cold as well as cloudy days flowering is delayed.
- * Flowers (white or greenish) born singly and are terminal.
- * Pedicel is 1.5 cm long.
- * Petals are 6
- * Stamens are 5-6 near the base of corolla.
- * Ovary is 2 celled.
- * Style is simple white of purple.



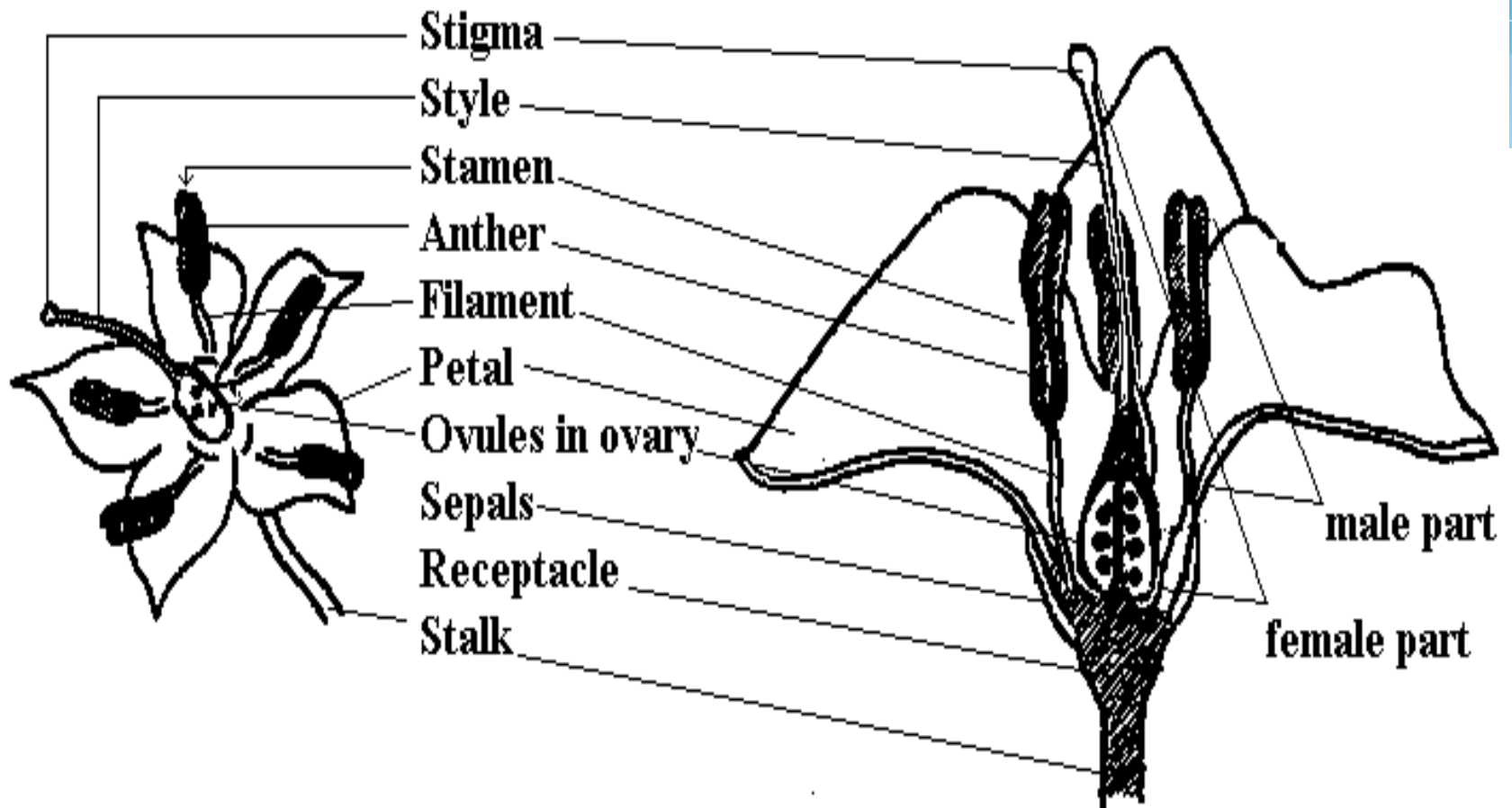
Continue.....

- * Anthesis takes place some time after the flower opening.
- * Flowers remain open for 2-3 days.
- * Anthesis takes place at 7:15 AM up to 11:15 AM in the morning with peak at 7:15.
- * Dehiscence takes place 13 minutes after anthesis.
- * Stigma become receptive from the day of anthesis and remain receptive up to 2 days after anthesis.
- * Stamens are 5 in no and erect.

Chilli flower

Flower

Half flower diagram





Flower bud of chilli



Chilli Flowers



Floral Biology of Brinjal



- Flowers are large and stalked.
- * Pedicel is light green and 1.5 cm long.
- * Calyx is tubular and grayish green and 1.5-2 cm long.
- * Petals are 5-6
- * Corolla is light to dark violet.
- * Flowers appear 40-50 after transplanting.
- * Anthesis occur 6-8 AM in August-September, Usually 9:30 to 11:15 during winter. Peak time is 8:30 to 10:30.
- * Pollen dehiscence starts from 9:30 to 10 AM.
- * Stamens are 5 and erect.
- * Pollen grain remain viable for a day during summer and 2-3 days in winter.



Continue.....

- * Stigma receptivity ranges from a day prior to flowering opening to 4 days after opening.
- * Stigma receptivity could be observed from pump and sticky appearance with brown colour.



Brinjal Flowers

Floral Biology of Okra

- * Flowers are solitary and 2cm long peduncle
- * Petals are 5, yellow with crimson spot and 5-6cm long
- * Ovary is superior and deep red
- * The flower bud appear in the axils of each leaf above 6th to 8th leaf.
- * Flower bud initiation take place 22-26 days after sowing
- * Flowering continues for 40-60 days
- * Stigma is more receptive on the day of flower opening
- * Anthesis is observed between 9-10am and stigma remains receptive on the day of anthesis.
- * Pollen remain viable for 55 days at 50% relative humidity
- * Pollen fertility is maximum during the period between 1 hr before and 1hr after opening of the flower
- * Pollen takes 2-6 hrs for fertilization after pollination

Floral Biology of Wax or Ash Gourd

(*Benincasa hispida*)

- * Flower of ash gourd is large, stalked and solitary
- * Flowers are unisexual, monoecious
- * Flowers are 6-9cm in diameter
- * Petal are 5, 3.5cm long and 2.4cm wide
- * Ovary of male flower is large
- * Anthesis take place 4.30-7.30 hrs with dehiscence at 3.00-5.00hrs
- * Stigma remain receptive 8hrs before anthesis to 18hrs after anthesis
- * Pollen fertility is maximum at anthesis

Floral Biology of Water Melon

(*Citrullus lantatus*)

- * Three type of flowers are produced
 - * Male flower
 - * Female flower
 - * Hermaphrodite flowers
- * Male flowers open first in the axils of 4th to 12th leaf
- * Few days after male flower opening female and hermaphrodite flowers open in the axils of 25th -30th leaf
- * The male : female flower ratio ranges between 6 to 10.1 in early and 20 to 25.1 in late cultivars
- * More female flowers are formed in spring than in autumn
- * Flowers open shortly after sun rise and remain open only for one day
- * Anthers dehisced before flower anthesis
- * Stigma remain receptive throughout the day
- * Pollens from hermaphrodite flowers germinate rather slowly than that of female flowers but equally effective for fertilization
- * Pollens lose their viability after 30hrs