

Subject – Plant breeding

Topic – Floral biology

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FLORAL BIOLOGY

Floral biology includes the morphology , anthesis and mode of pollination of flowers .

Floral morphology of a crop is studied under the following topics .

- Basic structure of a flower
- Sexuality of flower
- Monoecious condition
- Flowering duration
- Emergence of flower inflorescence
- Sequence of blooming in an inflorescence

Floral biology of some crops

Rice

Oryza sativa

- ❖ The inflorescence is a terminal panicle bearing single flowered spikelets.
- ❖ The panicle completes emergence from flag leaf in two to four days.
- ❖ A single panicle takes about four to ten days to complete blooming.
- ❖ Most of the flowers bloom on second day or third day ,after the emergence from flag leaf
- ❖ Blooming starts from the apical spikelets and proceeds downward.

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- ❖ Maximum blooming occurs between 8 a.m. and 11 a.m.
- ❖ Flowers have 6 stamens.
- ❖ Anthers dehisce and shed pollen just at the time of opening of the flower.
- ❖ Receptivity of stigma is maximum during the first three days after the opening of the flowers and then gradually decreases and is lost within seven days

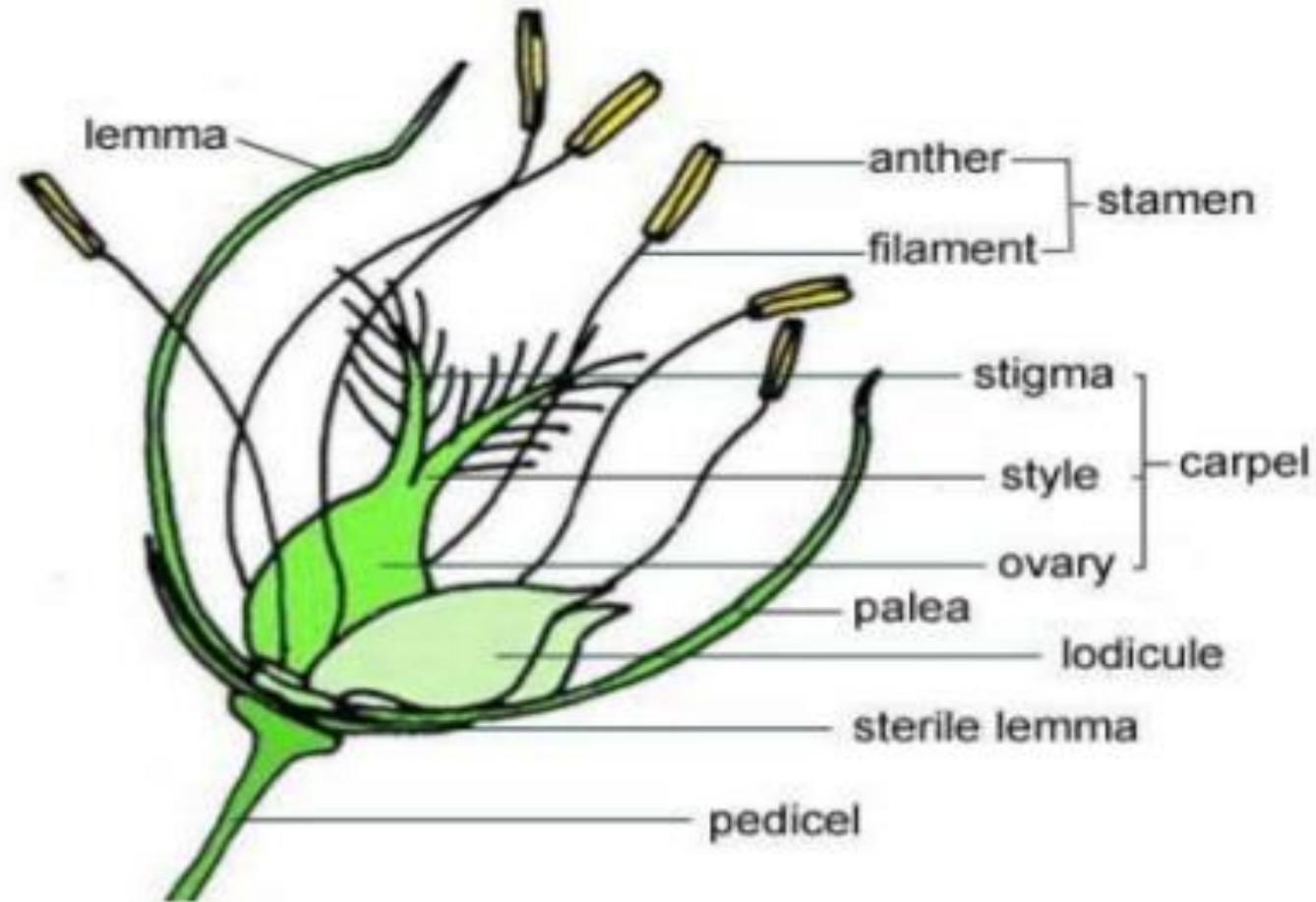
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- ❖ Under natural condition **viability** of **pollen grains** is only for **5 minutes** after anthesis .
Preservation of rice pollen grain is possible for **24 hours** at **54 degree F** with **95% humidity** .

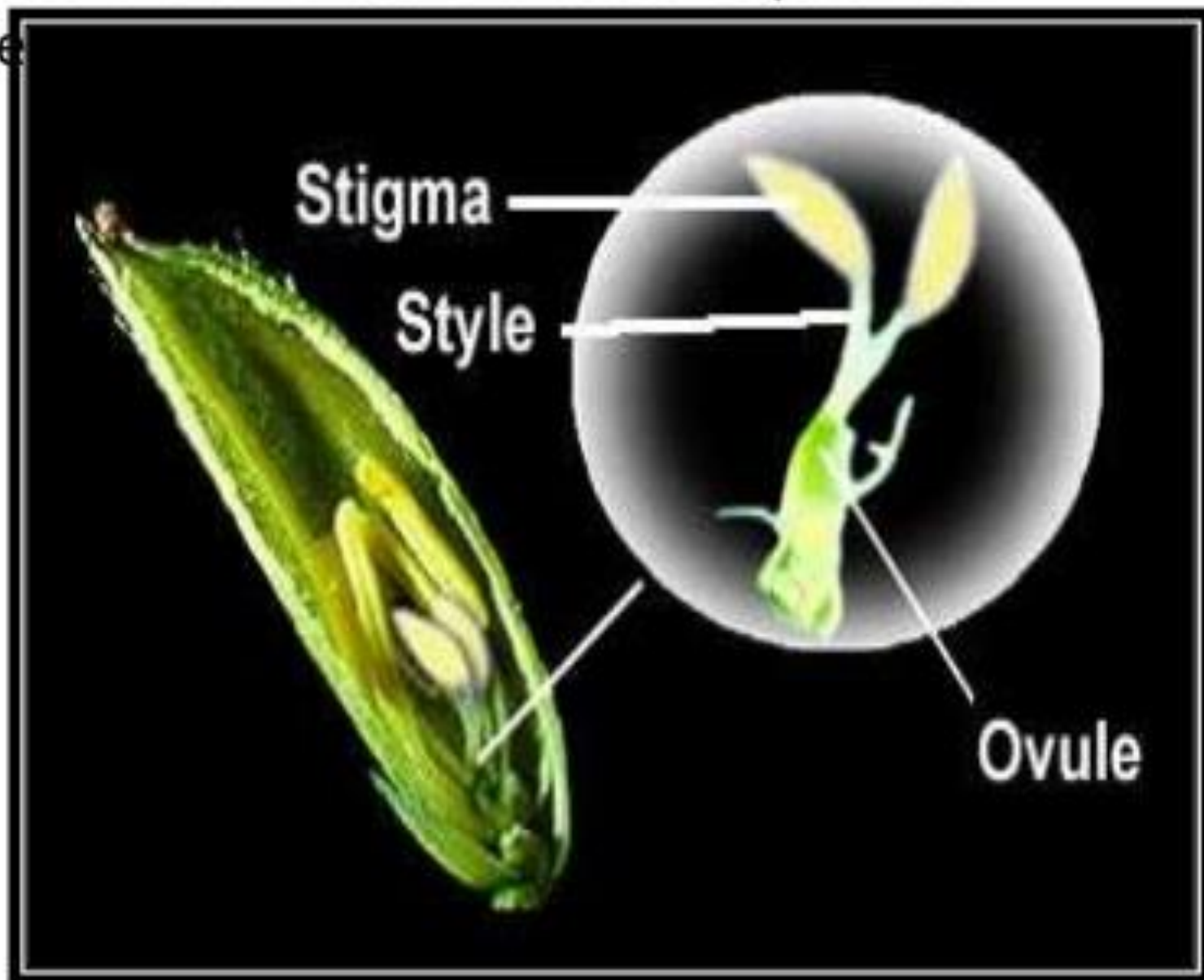
Inflorescence of paddy



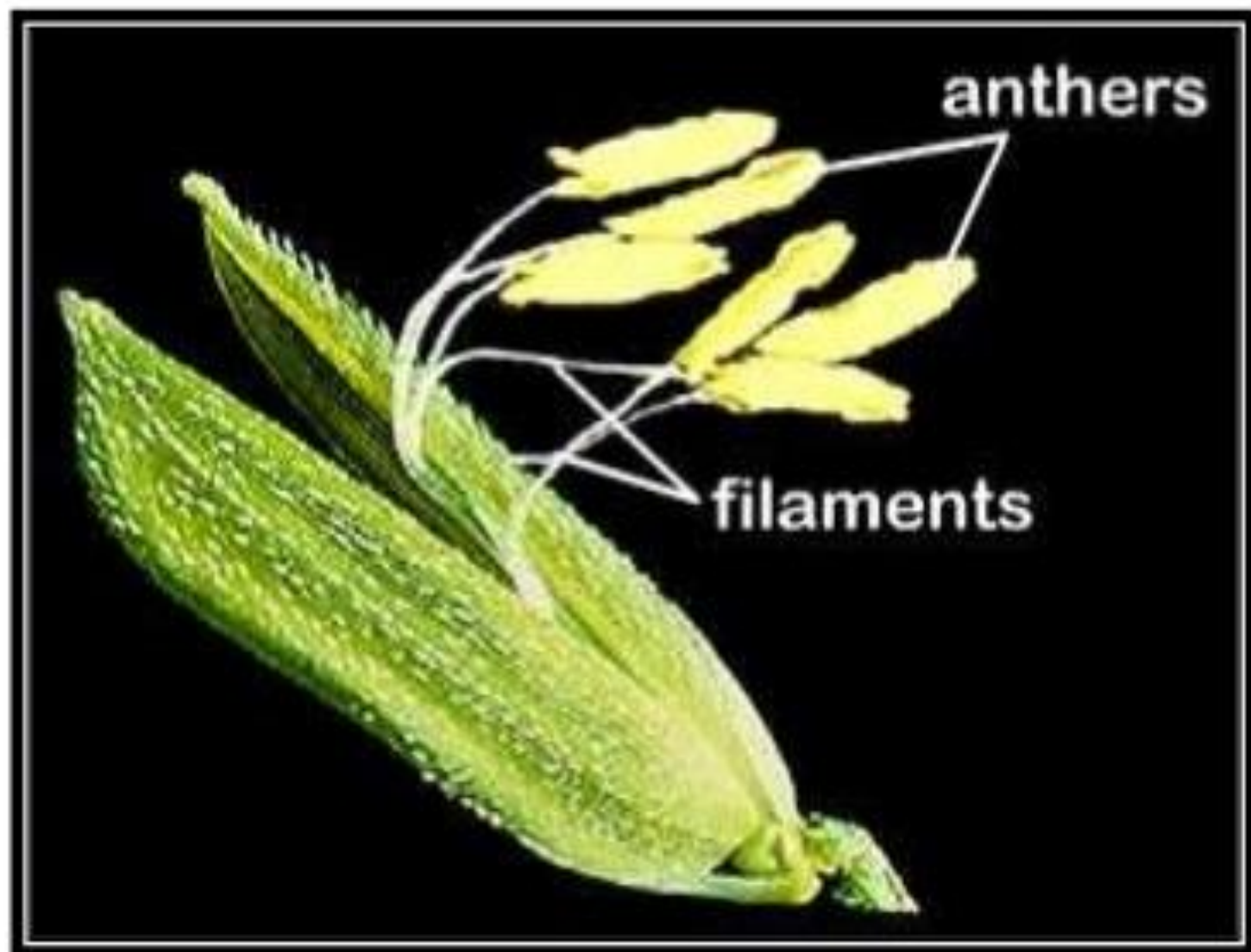
Parts of spikelet



- The pistil contains one ovule and bears a double-plumed stigma on a short style



- The stamens have two-celled anthers borne on slender filaments.



MANGO

Mangifera Indica

Family : *Anacardiaceae*

Floral biology

- ❖ Flower starts opening early in the morning from 4-7 a.m. and maximum flowers open between 9.30-10.30 a.m. and complete 11.a.m.
- ❖ Dehiscence of anthers takes place at 11.30 a.m. and it continues up to 3.45 p.m.

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- ❖ Inflorescence is a large terminal panicle.
- ❖ Flowers are small , sessile, deciduous and yellowish –green .
- ❖ Calyx consists of four to five free deciduous sepals.
- ❖ Corolla comprises four to five deciduous and spreading petals .
- ❖ Androecium consists of 4 to 5 stamens of unequal length.

- ❖ One or two of them are longer and fertile .
- ❖ Others are sterile or staminode.
- ❖ Ovary is conspicuous yellowish white.
- ❖ Stigma is simple and small.
- ❖ Anthesis in the morning.
- ❖ Anther dehiscence starts from 4-7 a.m.
- ❖ Receptivity of stigma coincides with anther dehiscence.

- ❖ The pollen grains are oval, or triangular or oblong.
- ❖ Stigma becomes receptive even 18 hours before flower opening.
- ❖ Mode of pollination is entomophily; nectar is present to attract the insects.
- ❖ The flowering duration is usually of short i.e. 2 to 3 weeks.
- ❖ The mango inflorescence or panicle bears mainly two types of flowers – male and perfect.
- ❖ The number of flowers per panicle varies between 1000 to 6000 depending upon the variety and climatic factors.

Terminal panicle of mango



Parts of mango flower



Panicle and fruit



Significance of Floral Biology in Plant breeding

A knowledge of **mode of reproduction** of crop plants are **important** in **plant breeding** , because **it determine** the **breeding methods** to be employed in a particular crop.

Mode of **pollination** determines the **genetic constitution of plants**. Self pollinated crops are normally **homozygous** and cross pollinated are **heterozygous**.

It is important in making **artificial hybrids**.

To study the **time of opening and closing of flowers**.It help to perform **artificial pollination**.

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- A knowledge of **morphology of stamen** and **number of fertile stamens** helps to determine the **procedure of emasculation** during hybridization.
- To know **the time of anther dehiscence** will help the **collection of pollen grains**.
- **Viability** of pollen grains is important. **Pollination** has to be **completed before the loss of viability**. E.g. rice only for five minutes after anthesis .
- **Receptivity of stigma** is an important factor **in hybridization**. Pollination should done during the **receptive period of stigma**
- An understanding of **mechanisms of pollination** is very important in plant breeding. It helps **to adopt precautions** necessary **for protection from foreign pollen**.

THANK YOU