

Contents

1	Study of floral parts of field crops	1
1.1	Objectives	1
1.2	Theory	1
1.3	Materials required	1
1.4	Procedure	1
2	Conclusion	7
3	Hybridization of crops available in the field	7
4	Plant breeding data recording	7
5	Determining genetic purity	7
6	Maintaining genetic purity in the field	8
7	Disease scoring and determining resistance and susceptibility to pests	8
7.1	Resistance and susceptibility	8
7.2	Disease scoring	8
8	Describing the traits for release of a new variety	8
9	Study of activities at National Maize Research Programme (NMRP)	8
10	Study of activities at National Grain Legumes Research Programme (NGLRP)	8

1 Study of floral parts of field crops

1.1 Objectives

To be familiar with different parts of flower and their functions To know the floral morphology and mode of pollination in crops

1.2 Theory

Flowers are the reproductive organs of a plant which lead to the development of fruit and seed. ? How flowers are important part of evolutionary history in crops ?

The floral morphology is the study of forms and features of flowers. ? Add a brief history to this ?

The genetic constitution of a crop depends on the mode of pollination of the crop ?. Floral morphology dictates the mode of pollination in flowers. Therefore, it becomes an essential for a plant breeder to know the structural organization and basic nomenclature associated with commonly cultivated crops' flowers.

```
# pdftools::pdf_convert("/home/deependra/Desktop/BSc_Ag_lectures/literatures/Plant Science Straussberge
knitr::include_graphics("./images/rice_floret.png")

knitr::include_graphics("./images/rice_panicle.png")

knitr::include_graphics("./images/wheat_kernel.png")

knitr::include_graphics("./images/wheat_spikelet.png")
```



Figure 1: Flower and fruit morphology of poales. Wheat, *Triticum aestivum* with (c) spelt and (d, e) wheat. (k) Wheat grain (caryopsis). (i, j) Rice, *Oryza sativa*. a point of emergence, c coleoptile, cr coleorhiza, d lemma, f fruit furrow, h glume, l vascular bundle, r radicle, s scutellum, v palea, vk shoot apex, w root cap, z cylindrical epithelium

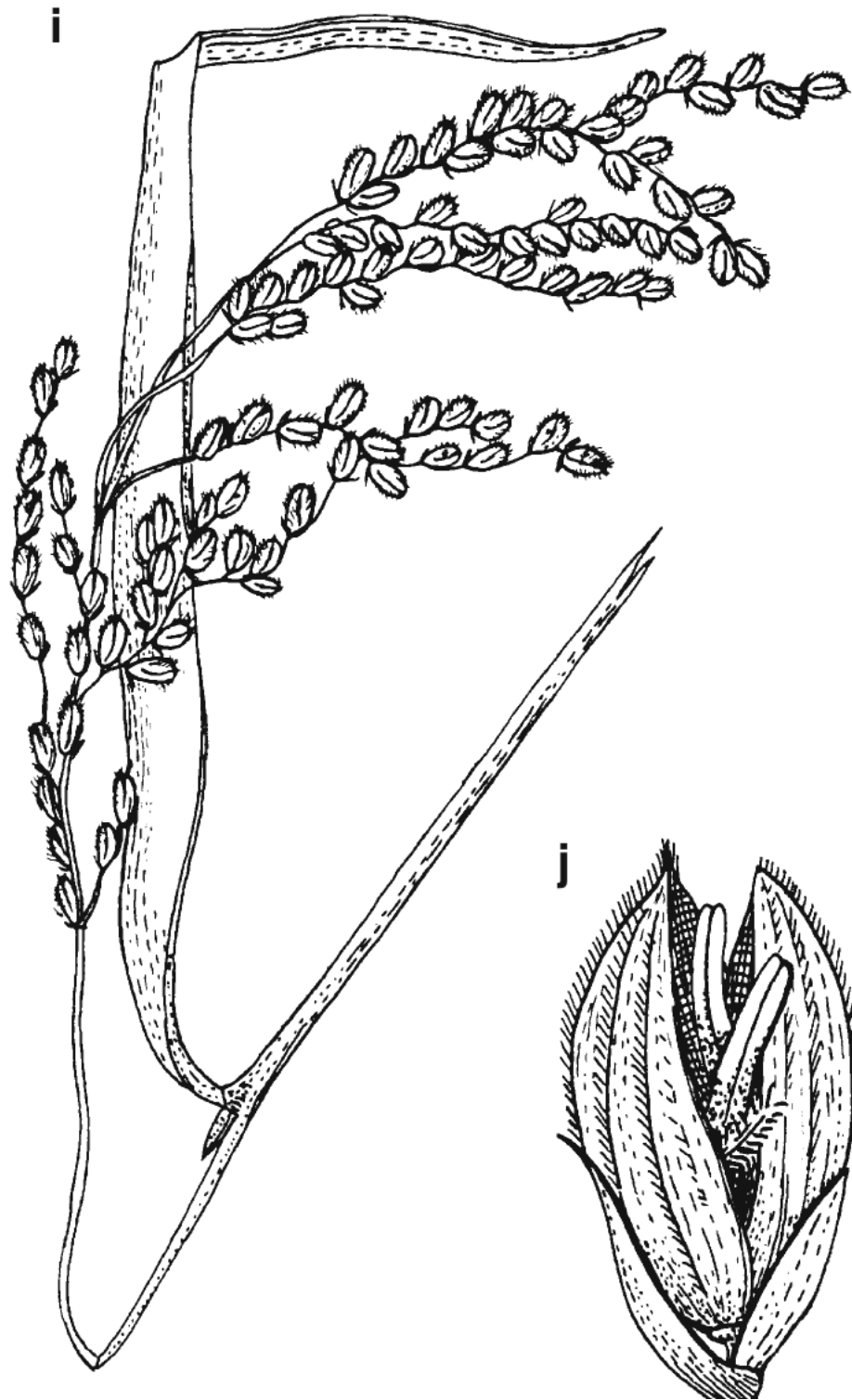


Figure 2: Flower and fruit morphology of poales. Wheat, *Triticum aestivum* with (c) spelt and (d, e) wheat. (k) Wheat grain (caryopsis). (i, j) Rice, *Oryza sativa*. a point of emergence, c coleoptile, cr coleorhiza, d lemma, f fruit furrow, h glume, l vascular bundle, r radicle, s scutellum, v palea, vk shoot apex, w root cap, z cylindrical epithelium

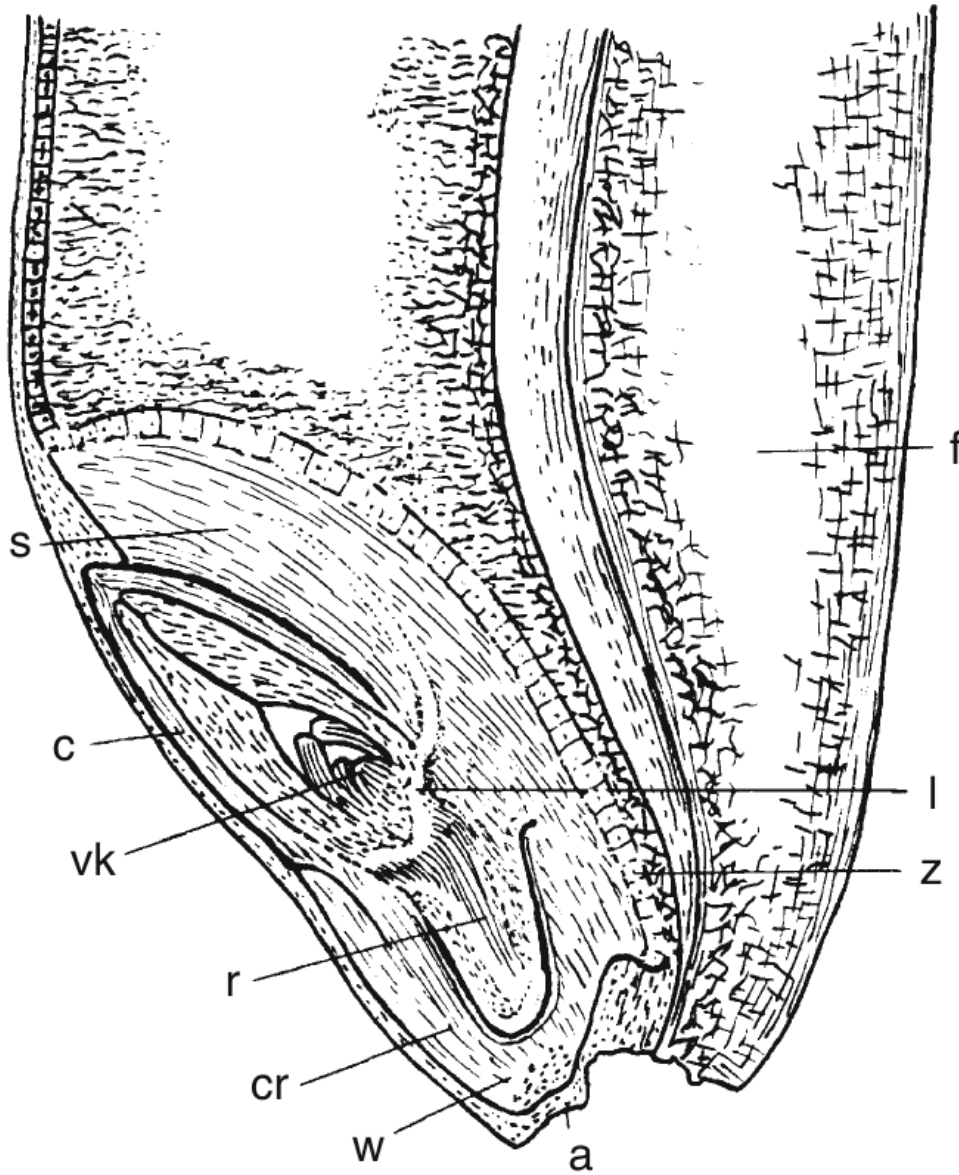


Figure 3: Flower and fruit morphology of poales. Wheat, *Triticum aestivum* with (c) spelt and (d, e) wheat. (k) Wheat grain (caryopsis). (i, j) Rice, *Oryza sativa*. a point of emergence, c coleoptile, cr coleorhiza, d lemma, f fruit furrow, h glume, l vascular bundle, r radicle, s scutellum, v palea, vk shoot apex, w root cap, z cylindrical epithelium

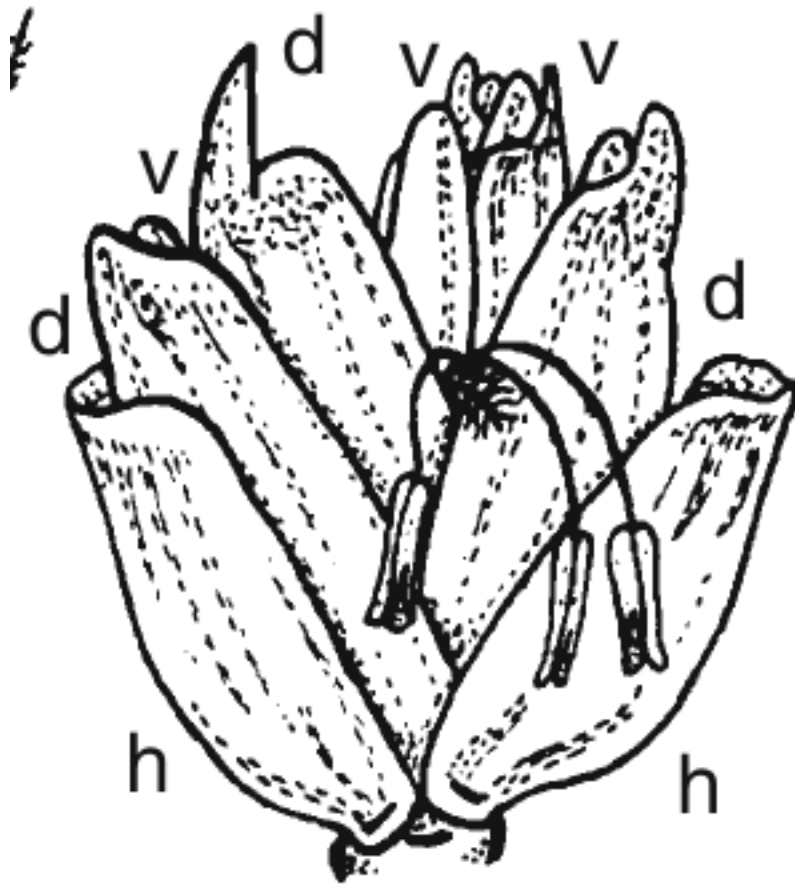


Figure 4: Flower and fruit morphology of poales. Wheat, *Triticum aestivum* with (c) spelt and (d, e) wheat. (k) Wheat grain (caryopsis). (i, j) Rice, *Oryza sativa*. a point of emergence, c coleoptile, cr coleorhiza, d lemma, f fruit furrow, h glume, l vascular bundle, r radicle, s scutellum, v palea, vk shoot apex, w root cap, z cylindrical epithelium

```
knitr::include_graphics("./images/wheat_spike.png")
```

The type of habitat that a species inhabits in determines the reproductive biology of that adapted crop to a large extent. A range of vegetation types (based on habitat) are identified for order poales, including: - Woodland - Grassland - Heathland - Wetland - Desert - Polymorphous

Flower morphology in turn affects the choice of tools and techniques to be used for hybridization. Prominence of reproductive organs – Stigma and anther – which is largely conserved in a species (cleistogamous and ?), is among a number of factors determining the mode of reproduction and complexity of undertaking a manual crossing. More on hybridization techniques in Practical 3.

1.3 Materials required

- Flower,
- Scissor,
- Petri dish,
- Magnifying glass,
- Notebook,
- Pencil

1.4 Procedure

- A fresh sample of flowers are obtained of crops.
- Flowers are dissected in lab, their nature and morphology looked closely with the help of magnifying glass, and the observed impression is drawn in notebook.

1.4.1 Following structures can be observed

1. Wheat/rice

- Bracteate type flower
- Inflorescence: Spike of spikelets or compound spikelets
- Mode of pollination: Self pollination
- Flowers of wheat and rice are complete and bisexual.
- ? refer to wheat valentine blog post

2. Pea

- Flowers are pedicilate, zygomorphic and hermaphrodite
- Sepals are gamosepalous, pentamerous
- Petals have axillary aestivation
- Androecium: Superior ovary (epigynous)
- Pollination: Self pollinated

3. Potato:

- Bisexual, complete, regular flower, yellow colored and self pollinated
- ?

4. Maize

- In maize, male and female inflorescence are located on different parts, namely tassel and ear, respectively.
- ? details



Figure 5: Flower and fruit morphology of poales. Wheat, *Triticum aestivum* with (c) spelt and (d, e) wheat. (k) Wheat grain (caryopsis). (i, j) Rice, *Oryza sativa*. a point of emergence, c coleoptile, cr coleorhiza, d lemma, f fruit furrow, h glume, l vascular bundle, r radicle, s scutellum, v palea, vk shoot apex, w root cap, z cylindrical epithelium

- 95% of the times, pollination is cross and 5% of the time only self-pollination takes place.

2 Conclusion

Hence, study of floral morphology done for some of the common crop species has inspired students about the importance of floral biology in overall reproductive habit of a crop and established that it's knowledge can aid in crop improvement activities, mainly through hybridization.

3 Hybridization of crops available in the field

Here is a review of existing methods.

4 Plant breeding data recording

We describe our methods in this chapter.

5 Determining genetic purity

Genetic purity is determined by purity testing of a variety or cultivar.

6 Maintaining genetic purity in the field

We have finished a nice book.

7 Disease scoring and determining resistance and susceptibility to pests

Diseases are bad!

7.1 Resistance and susceptibility

7.2 Disease scoring

8 Describing the traits for release of a new variety

We have finished a nice book.

9 Study of activities at National Maize Research Programme (NMRP)

We have finished a nice book.

10 Study of activities at National Grain Legumes Research Programme (NGLRP)

Is the NGLRP still in Rampur, Chitwan ?