PLB154 (Winter 2006)

Concepts in plant breeding

Information from class notes, textbook and readings

Gene pool

Gene bank

Phenology

Ex situ conservation

In situ conservation

Three major phases in plant breeding

What was the ear-to-row experiment and why was it ultimately a failure? What should breeders do to avoid this situation?

The 20th century has seen marked increases in crop yields. To what factors have these increases been attributed. Design an experiment to test your theory.

What are some traits modified by selection during domestication? What are some characteristics of their inheritance?

Give 10 examples of objectives pursued by plant breeders?

In 1980, the U.S. Supreme Court overturned an earlier decision of the Patent Office (Chakrabarty vs. Diamond). In turn, this Supreme Court decision lead to a significant change in the intellectual property rights (IPR) regime for living matter. Describe the IPR situation before and after the U.S. Supreme Court's decision.

Contrast PVP, plant patent, and utility patent.

Briefly discuss four international treaties that impinge upon crop IPRs.

What are the root causes of the overall reduction in genetic diversity observed since the

20th century in crop gene pool and what are the potential consequences?

Contrast *ex situ* and *in situ* conservation: a) what are they; b) what are their perceived advantages and disadvantages?

Contrast two types of breeding projects: a) varietal development; vs. b) trait development

Describe and explain three dilemmas breeders are faced with when deciding on a selection strategy.

What is a complete diallel cross? Describe also less cumbersome versions of the diallel.

Kelly et al. (1998) describe the "breeding pyramid." Explain what it is. What are the breeding variables considered? What is the major focus of breeding programs in this pyramid?

Describe sources of variation a breeder is faced with in field experiments. What are two main ways in which a breeder deals with some of these variations.

Explain the difference between a completely randomized design and a randomized complete block design. Why is RCBD generally considered to be superior to CRD?

What is a split-plot design and under which circumstances would you use it?

Allo- vs. auto-polyploidy: define, provide 5 examples for each, distinguish inheritance modes, mode of origin

Discuss what a doubled haploid is, how it originates, and its potential benefit to plant breeding (see also Ch. 27 of Fehr).