

HORT 5304 (CRN 15253)

Genetics and Breeding of Horticultural Crops

Spring, 2006

Instructor: Richard Veilleux, 206 Saunders, 231-5584

Teaching assistant: Yeun Kyung Chang, 205 Saunders

Time/Place of meeting: 10:10-11:00 - MWF, 408 Saunders; Laboratory, 1:30-4:30 – W, 406 Saunders, March 17-May 5

Secretary: Joyce Shelton, 402 Saunders, 231-6972

Reading assignments: Reading assignments will generally consist of a review article or text chapter followed by a specific recent research paper within each subject area. Assigned readings will either be available either on-line or photocopies will be distributed.

Recommended text: Appels, R., R. Morris, B.S. Gill and C.E. May, 1998. Chromosome Biology. Kluwer Academic Publishers, Dordrecht. 401 pp.

Students who want to review topics at a more elementary level may read appropriate sections of a general textbook in plant breeding, e.g., Allard, R.W. 1999. *Principles of Plant Breeding*. John Wiley & Sons, New York or Fehr, W.R. 1987. *Principles of Cultivar Development, Vol. 1: Theory and Technique*. Macmillan Publishing Co., New York.

Evaluation: Problem sets, laboratory reports, mid-term examination, final examination

Lecture and discussion topics:

Genetic engineering	vectors of recombinant DNA, expression of foreign DNA in regenerated plants, examples of genetically transformed plants, field performance
Cell differentiation	endopolyploidization, differential DNA replication, polyteny in plants
Ployploidy	auto- vs. allopolyploids, disomic and tetrasomic inheritance, double reduction, trisomics, induced polyploids in crop plants
Unreduced gametes	mechanisms of formation of 2n pollen and 2n eggs in plants, genetic consequences of various meiotic aberrations, role in natural polyploidization, sexual polyploidization in plant breeding
Male sterility	mechanisms leading to male sterility -- cytoplasmic, genic and genic-cytoplasm -- implementation in hybrid seed production
Incompatibility	gametophytic vs. sporophytic mechanisms of self-incompatibility, S-allele identity, structure of the S locus, implementation of incompatibility in hybrid seed production
Haploidy	methods of obtaining haploids, breeding behavior of doubled haploid lines, gametoclonal variation