

**PLSC 731**  
**Plant Molecular Genetics**  
**Spring 2010**  
**Exam 1**  
**Due, April 6, 2012, 5 pm via e-mail**

Upon my honor, I have neither given nor received aid in writing this exam."

\_\_\_\_\_Name

This is an essay exam. You can use any materials you wish when answering the following questions. BUT, you cannot discuss the exam in any manner with any other person in the class, the department, or any place in the world. This must be fully your own work.

You must answer all questions with **complete sentences**. If you use a table or a figure, it must be referenced in your answer. Provide a through answer, but the answer to each question cannot be more than one page. Use the standard formatting guidelines required for your first two papers.

1. In a review by Kalendar et al. (2011), retrotransposon-based molecular markers are described. Study that paper and describe 1) LTR retrotransposon structure and genome organization, 2) the general utility of retrotransposons as markers, and 3) one marker system in detail (SSAP,IRAP, REMAP, or TAM). Finally, describe how these markers have been used for genome diversity and population structure studies. (**25 points**)
2. A useful molecular marker map is essential for any plant species. Summarize the marker development research of Gujaria et al. (2011) and describe how this was used to develop a new molecular marker map of chickpea. (**25 points**)
3. Hunt et al. (2011) evaluated broomcorn, an old cereal crop. They attempted to address the genetic structure of the crop and consider the question of the number of domestication centers. Please evaluate the paper and describe their methodology and conclusions. Also suggest additional experiments they might perform to better address this topic. (**25 points**)
4. Carefully review the stripe rust QTL paper of Hao et al. (2011) and determine if they have actually discovered a major QTL for the disease. In your analysis be sure to define a major QTL from your perspective. (**25 points**)

Gujaria et al. (2011) Development and use of genic molecular markers (GMMs) for construction of a transcript map of chickpea (*Cicer arietinum* L.) Theor Appl Genet 122:1557-1589.

Hao et al. (2011) Characterization of a major QTL for adult plant resistance to stripe rust in US soft red winter wheat. Theor Appl Genet 123:1401-1411.

Hunt et al. (2011) Genetic diversity and phylogeography of broomcorn millet (*Panicum miliaceum* L.) across Eurasia. Molecular Ecology 20:4756-4771.

Kalendar et al. (2011) Analysis of plant diversity with retrotransposon-based molecular markers. Heredity 106:520-530.