

PLSC 731 - Plant Molecular Genetics

Evolution, Domestication, Dissemination, US Commercialization, and Molecular Characterization of a Crop Species

Due: February 4, 2016, in class; (**note:** 25% penalty for late papers)

Grade value: 200 points

Whenever you work with a species, it is very important to understand the history of that species. When you are working with a crop species, it is important to understand the events that lead to the materials that are used in a breeding program. Finally, whenever applying molecular techniques, it is important to understand the molecular tools that are available for that crop species.

The purpose of this mini-review is for you to become very acquainted with one crop species. You will be given the species that you will evaluate. In most cases, this is the species that you are focusing on in your research. **This is a two person group assignment.** You are also assigned your writing partner.

- **The Evolution of the Species:** What is the taxonomic relationship of this species to other species in its genera and family? What is the estimate when this family and species diverged from its nearest phylogenetic neighbor?
- **The Domestication of the Species:** There is a distinct difference between wild and domesticated species of a plant. Describe these differences, and what is understood about the genetic control of these traits. Are there particular races of this species that relate to the domestication? When was this species domesticated and what traits were associated with the domestication?
- **Dissemination of the Domesticated Lines:** Crop plants all have a center of origin. First, describe the center of origin and how that was determined. What was the dissemination pathway of this crop throughout the world? How did this crop end up in the United States? You should pay particular attention to the races and how they were distributed throughout the world.
- **US Commercialization of the Crop:** Each crop species has been commercialized in the United States. Therefore, at some point in time, the crop was brought into the US, and plant breeding efforts began with those materials. Subsequently other materials were introgressed into this original material, and new modified germplasm was created. Describe all of these events, and provide experimental results that used molecular techniques to describe the diversity of the original materials and the variability of the "current" breeding materials. What are the current levels of production (acres) in the US.
- **Molecular Characterization of the Species:** You should conclude your review by discussing a) the number of chromosomes and genome size of the species; b) the types of the molecular marker maps that have been developed and the genetic distance of those maps by focusing on recent papers; c) the nature of the parents used to develop these maps and why the parents were chosen; d) three interrelated examples of the application of molecular markers for genetic studies with this species; e) the major features described in the sequencing paper for the species.

*You must make sure that your review is current. I will check to see if you are using the most current literature. Simply basing your review on one submitted in the past by another student in the past will result in a low grade. Research has been abundant in this field in the past few years. **Therefore it is important that you prepare a very current review.***

Format

- **Length:** Body: 6 full pages (maximum); title and name should be at the top of the first page
- **Font:** Times Roman, 12 pt
- **Margins:** One inch on each side and top and bottom. (**Note:** The MS Word default is 1.25 inch; if you do not know how to adjust the margins seek help from someone.)
- **Spacing:** 0.5" indent for each paragraph; each paragraph single spaced; a double-space between each paragraph
- **References:** A separate reference page is required. Select a journal and use the reference style from that journal. The maximum number of WWW sources is **one**.