

**PLSC 731 - Plant Molecular Genetics**  
**Exam 2 – 2020**

**Points:** 100 pts

**Due:** Tuesday, May 12, 2020; 12:00 pm (Submit by e-mail to: phillip.mcclean@ndsu.edu).

**Rules: You CANNOT DISCUSS this exam with anyone else or give assistance to anyone else. You can use ANY resource you would like while studying for and writing the exam. All answers must be entirely your own; no direct quotes from any source are allowed. All answers must use the following format: MS Word (NO pdf) format; Times Roman, 12 point font; one-inch margins all around; double space between paragraphs.**

- 1.** Describe in detail the approach you use to review a professional, peer-reviewed manuscript. Explain your reasons for this approach? What criteria do you use to determine the value of a manuscript? **(20 points; ½ page maximum)**
  
- 2.** The duplication history of plant genomes is a major theme in plant evolution that also informs plant molecular genetics and biology. Develop an essay that discusses the topic in the following order. A) How was it discovered that plants have a genome duplication history? B) Summarize the general theory regarding the duplication history of both dicots and monocots. C) Describe the possible functional changes that duplicated genes can undergo and the consequences of duplications on plant form and function. D) Lastly provide a research approach that utilizes what is known about the evolutionary history of two related species to develop a marker linked to a gene of interest in your species. **(20 points; maximum 1 page)**
  
- 3.** Describe the three common steps for the synthesis of the major classes of plant non-coding small RNAs. Next describe biochemical steps by which a gene's expression is regulated by mRNA slicing. **(20 points; maximum 1/2 page).**
  
- 4.** Create a two-column table. In column one, list five genes whose functions are modified/controlled by a plant transposable element referenced in Table 1 of the Wei and Cao (2017) review. (See Plant Transposable Element section for the paper.) In column two, using only two sentences for each gene, describe the phenotype that is controlled by that gene. **(20 points)**
  
- 5.** For this question, you will be summarizing the Si et al. 2016 manuscript (see Plant Transcription, Transcription Factors, and Chromatic Remodeling section for paper). Create a two-column table that provides the experimental steps and results that proved "*OsSPL13* positively increases cell size and grain yield". In column one, list all the critical experimental steps used to discover the QTL *GLW7* seed size gene in rice. In column two, in complete sentences, state why the step was performed and what the major result was obtained from that step. **(20 points)**

**By submitting your exam answers, you are agreeing with the following statement: "I have not received nor given aid in completing this exam."**