[INTRUCTIONS – REPLACE EVERYTHING THAT IS HIGHLIGHTED AND IN SQUARE BRACKETS WITH YOUR OWN TEXT (AND FIGURES/LEGENDS FOR THE RESULTS)]

**Plant growth and reproductive allocation in a dominant tallgrass prairie species, *Andropogon gerardii,* in upland and lowland habitats**

[Full Name]

[Lab Section]

[Date]

**Introduction**

Plants have no choice but to remain in their environments, in contrast to many animal species that have the ability to migrate to new environments. Consequently, plant growth patterns are genetically programmed to be quite flexible (called phenotypic plasticity) in response to variable environmental conditions on a spatial and/or temporal basis. These “plastic” traits can be both morphological and physiological. There are often trade-offs in the energy allocated to vegetative vs. reproductive structures within an individual, depending on which strategy may maximize the individual’s reproductive success.

Plant morphological traits can also be genetically determined regardless of environment. Common garden experiments, where seeds from different populations of plants in very different habitats (such as higher elevation and lower elevation on a mountain) are grown in the same environment, have shown a genetic basis to their physical traits, as demonstrated in a study on *Spartina* where plant heights and flowering density remained fixed in different genotypes after nine years in a common garden (Gallagher *et al.* 1988).

Traits that have a genetic basis are subject to natural selection. The first step in the study of evolution by natural selection is to study variation in natural populations. We recorded variation in big bluestem prairie grass (*Andropogon gerardii*) in two different environments: an “upland” slope with sandier, drier soils, and a “lowland” location with higher moisture soils and in close proximity to a wetland. A study on switchgrass, *Panicum virginatum*, found more robust growth in lowland vs upland populations, and differences in 15 out of 18 characters was retained in a common garden experiment, indicating these differences between these populations were genetically determined (Porter 1966).

This study examined the effects of a upland or lowland habitats on the growth and reproductive allocation on a plot of restored prairie dominated by *A. gerardii*, a warm season grass with a C4 photosynthetic pathway. Our null hypothesis was that plants heights and rame lengths would not differ between the lowland and upland locations. Our alternative hypotheses were that the lowland population *A. gerardii* would be [taller or shorter (add what you wrote in your lab manual)] and the rame lengths would be [longer or shorter (add what you wrote in your lab manual] than the upland population of *A. gerardii.*

**Methods – 3 pts**

[Refer to the guidelines for lab reports handout and revise, if necessary, your methods paragraph that you wrote in your lab manual to make sure your paragraph addresses each point]

**Results – 4 pts**

[First, double check the quality of your figure legends and results paragraphs and revise, if necessary. Then copy and paste your four figures, your figure legends, and the t-test results statements from the ‘data lab 1’ assignment. Arrange them so that the correct figure legends are underneath each figure, and the t-test results paragraphs are one right after the other, and after the figures.

**Discussion – 6 pts**

[Refer to the lab report guidelines handout for instructions on writing your discussion. MAKE IT AS LONG AS THE INTRODUCTION (one page)! Make sure that you cite information/results from **at least three papers** (two articles are included in the back of your lab manual; you will have to visit the MSUM Library webpage and/or Google Scholar and search for an additional article and get the full text version of it to read the abstract, intro, and conclusions (you will not have time to read the entire paper during lab). Note that the information below is merely to help you locate the papers; they are not cited correctly):

**References – 2 pts**

[Refer to the lab report guidelines handout for instructions on citing your end references. Make sure that you include full citations, as instructed in the Primary Literature Lab in your lab manual, for the papers that were cited in the intro and discussion. List them in alphabetical order by last name of first author. Make these single spaced, please. Remember to include at least four references: the two papers in the back of your lab manual, the Gallagher *et al.* (1988) paper that was cited in the Introduction, and one additional paper that you search and find on your own.

Here is the full citation for the Gallagher paper:

Gallagher, J, Somers, G, Grant, D, Seliskar, D. 1988. Persistent Differences in Two Forms of Spartina Alterniflora: A Common Garden Experiment. Ecology. 69(4): 1105-1108