Eco/Evo Lab. S. Schuler (2020)

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Lab 4 Exercise: Vegetation Restoration

# PART 1

The native plang restoration project was designed with 45 10x10 m plots spread across three different habitat zones (sandy, gravel, and sandy-loam soil). One threat to the successful establishment of native plant seedlings is competition from weeds. Therefore, the restoration team also imposed experimental treatments to control weeds. In one weed treatment they placed a burlap mat over the ground (Figure 1). The second weed treatment they scattered native grass (*Poa secunda*) seeds between the plants. They also left some area as controls for comparison.

A picture containing grass, tree, hill

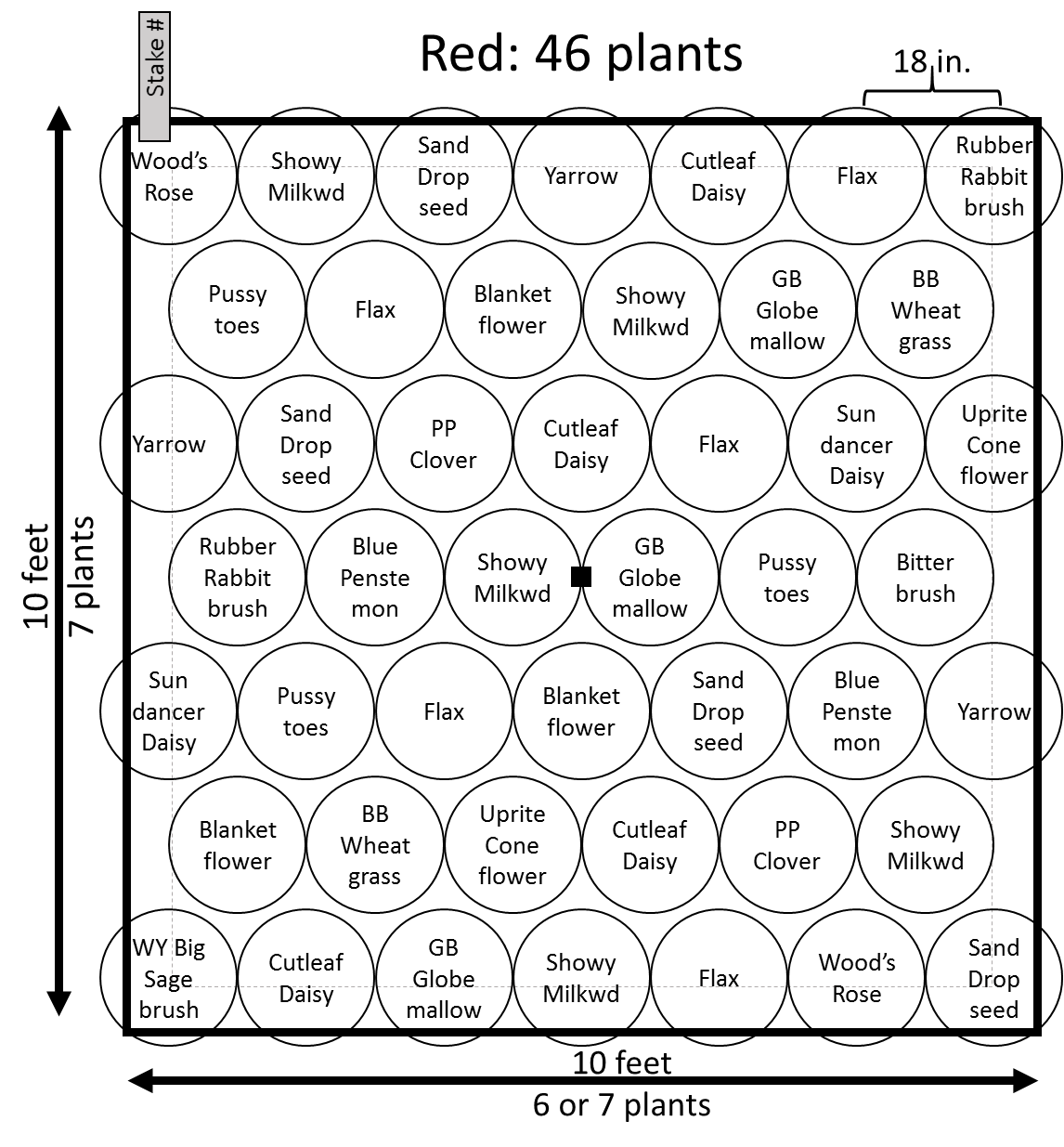
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Figure 2. Example layout of native plants within a plot.

Figure 1. One of the native plant restoration plots with the burlap mat treatment. Native plantings are surrounded by mesh collars to prevent herbivory. Photo credit: Kim Bahruth.

The first dataset that we will explore is survival of native plants one year after they were planted. In each of the 45 restoration plots, approximately 46 native plants were planted (Figure 2) and IBO interns monitored the plots in 2019 to see how many of the plants were alive or dead They also noted the soil type at each plot (sandy, sandy-loam, or gravel) and the weed treatment implemented:

***C*** *= control, where no weeding of non-desirables took place,*

***B*** *= burlap weed mat installed to prevent weeds, and*

***N*** *= POSE (Poa secunda) native grass planted after removal of non-desirables*

Open the Lab 4 Datasets Excel file (Item 4.7 in the Lab 4 Blackboard folder). Open the **Plant survival** tab.

* + - 1. Before you analyze the data, form a hypothesis for how you think weeding in general will affect native plant survival.
      2. Predictions are related to hypotheses, but they are specific to the way an experiment was designed. They make explicit how you think a treatment will affect the dependent variable in your study, if your hypothesis is true. A helpful way to formulate a prediction is: “If my hypothesis is true, then…”. When you finish that sentence you should state how the dependent variable will compare between the different treatments.
      3. Which test should be used to perform the analysis?
      4. Recall that whenever we run statistical analyses, we have a null hypothesis and an alternative hypothesis. What are the null and alternative statistical hypotheses for this analysis? Make sure you use the appropriate mathematical notation.

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HA: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Before we run the analysis we need to manipulate the data within the spreadsheet. Follow directions 1-5 in the textbox within the Excel file to calculate percent survival and reorganize the data.

* + - 1. Complete the analysis within the Excel worksheet and take a look at the output. Do the results support or reject the null hypothesis?

After reviewing the analysis, it is important to relate the information back to the original research question that was determined at the beginning of the process. The conclusions should be appropriate to the design of the study, and should essentially provide the IBO land managers with a sense of direction that their restoration efforts are heading.

* + - 1. Write up a short paragraph (3-6 sentences) summarizing the findings and answering the research question.

# PART 2

The next dataset that you will examine focuses on one iconic plant species in the restoration plots, Wyoming big sagebrush (*Artemisia tridentata* sp. *wyomingensis*). Student volunteers visited the plots and measured the height of each sagebrush plant in the plots. They also recorded the weeding treatment and soil type that each sagebrush was growing on. Within the Excel document, select **Sagebrush height** at the bottom of the screen to review the data.

For this lab exercise, we will be focusing on how weeding treatment impacted sagebrush growth. One of the IBO’s restoration management goals is to find a weeding treatment that significantly contributes to sagebrush performance, which is recorded as growth (e.g., height).

* + - 1. Use your statistical analysis output to fill in the mean percent survival of native plants based on weed preventative treatment below:

| Weed Treatment | Mean sagebrush height (m) |
| --- | --- |
| Burlap |  |
| Control |  |
| Native Grass |  |

* + - 1. What was the p-value of the analysis you did? Based on this p-value, what statistical and biological conclusions can you make?