Harvard Forest Schoolyard Science Data II Workshop, Thursday December 11, 2014

Overall Objectives of Graphing Exercises:

In today's exercises, you will practice creating graphs from an existing data set. Harvard Forest staff are available to help you in preparing your graphs. The exercises are designed to be carried out sequentially, with each exercise building on skills learned and practiced in the previous one.

You have the option of creating the graphs manually, by using the graphing tools provided in Excel, or by using another graphing program on your computer. The graphs, the goals for those working in Excel, and things for you to consider about each graph are presented below.

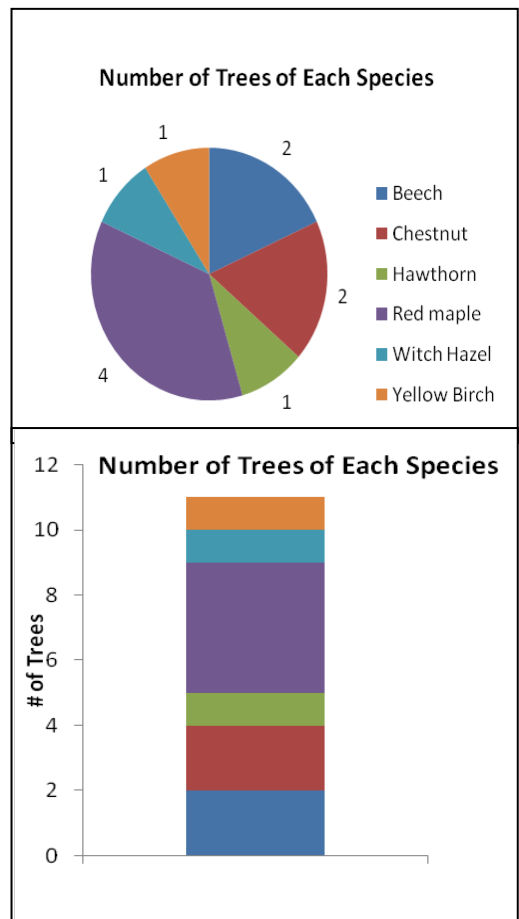If you choose to work with Excel, detailed instructions for the five exercises are provided separately.

An Overview of Five Graphing Exercises

1. Pie Chart – Create a pie chart showing the distribution of tree species in the Athol-Royalston study of Buds, Leaves, and Global Warming.

   Working in Excel, you will select a data table from a spreadsheet, create a pie chart that displays the data graphically, and practice formatting the graph by adding/changing the graph title, axis titles, labels for the pie wedges, graph colors, and other features.

2. Stacked Bar Graph – Create a stacked bar graph showing the distribution of tree species in the Athol-Royalston study of Buds, Leaves, and Global Warming.

   Working in Excel, you will learn to use the Source Data dialog boxes to specify and organize the data you are graphing. First, you will use the Data Range tool to specify the portion(s) of a data table that are to be graphed. Then, you will use the Data Series tool to enter data to be graphed in a specific order, or series. Once you are comfortable with the Source Data dialog, you will format the graph.
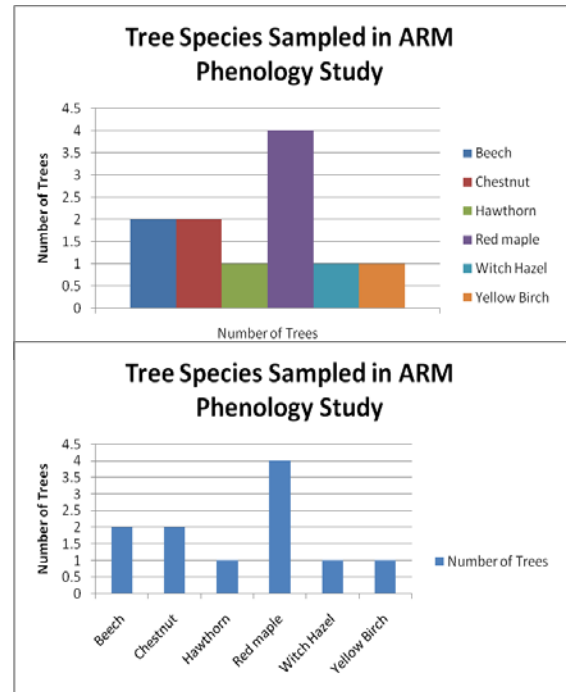
Compare the two graphs you have made. Both lack an X-axis and present data in a simple, proportional format. Compare the information shown. Which is easier to read and interpret? Which might be more useful for your students?

3. Basic Bar Graphs – Using the same data as in Exercises 1 and 2, create a bar graph that shows the number of trees of each different species studied in a school's schoolyard science program.

    Working in Excel, you will use the Chart Type and Switch Rows/Columns tools to switch from the stacked bar graph you created in Exercise 2 to a basic bar graph showing the data individually by tree species.
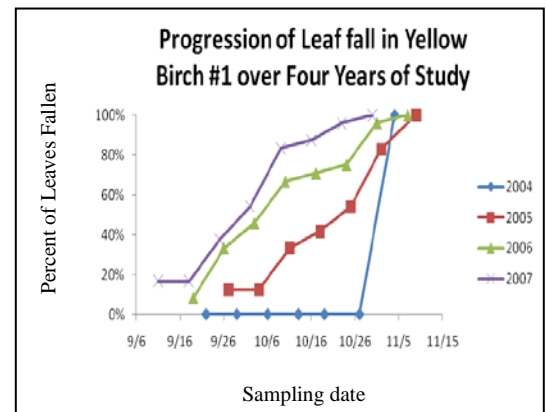
    You will format the graph by adding a title, labeling the axes, determining where to put the tree-species labels, and adjusting the Y axis if necessary to reflect the nature of the data (Excel may have listed axis units in ½ increments, but there are no "half-trees" in the sample, so you may need to adjust the axis accordingly).

Consider the different ways the tree-species data have been graphed. Which format do you find most effective? What can your students learn from creating different graphs from a single set of data?

4. Scatter Plots – This exercise involves working with a school's leaf-fall data from the fall sampling season. First, data on numbers of leaves that have fallen are converted to the percent of total leaves fallen. The data then are graphed, with the X axis representing the date/day of year, and the Y axis representing the percentage of leaves that have fallen on each date.

    Working in Excel, you will use the Source Data dialog box to select data collected for a single tree, Yellow Birch 1 (YB1), in fall of 2004, from Athol-Royalston study of Buds, Leaves, and Global Warming, and create a graph showing the percent of leaves that had fallen on each study day. You will adjust the axis scales so that your data are more clearly shown on the graph, look at different shapes and sizes for the points on the graph, and experiment with lines for connecting successive dates' data.
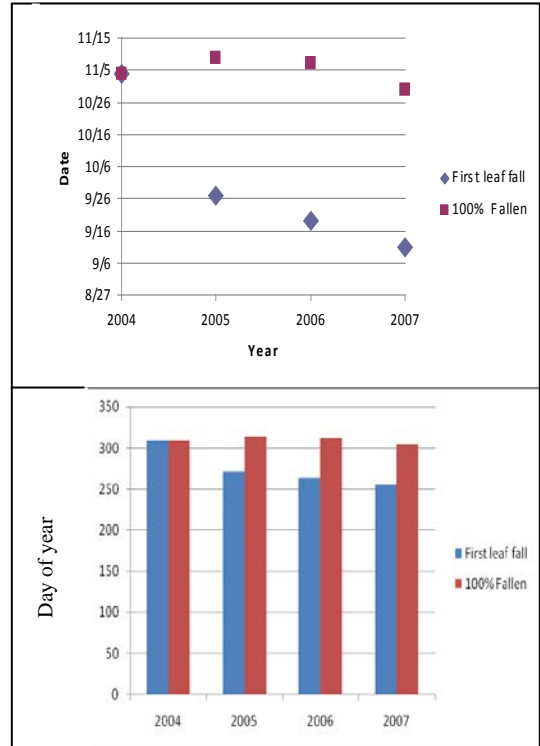

    Once the first year's data are graphed to your satisfaction, expand the graph to add three more years of leaf-fall data for the same tree.

    Working in Excel, you will overlay three more years of data for Yellow Birch #1 on your leaf-fall plot. You will choose different symbols or colors to represent the different years' data.

5. Scatter plot and bar graphs of first and last leaf-fall dates for four years of sampling – as with Exercise 4, this exercise involves manipulating the data to obtain additional information. You will determine the date on which the first observation was made of leaves having fallen, and the date on which all leaves on the study tree had fallen, create a data table with these dates for each of the four years being considered, and graph the data. You will create both a scatter plot showing the two points for each year, and a bar graph showing the two dates side by side.

Those working in Excel will be able to practice skills developed in the previous exercises, including:

- selecting data for graphing from the data table you create
- using the Data Range and/or Series Tools in the Source Data dialog box
- using the Change Chart tool, and
- formatting axes, labels, titles, colors, and other features of the graph.

General Graphing Questions/Reflections:

Once you have completed all five exercises, reflect on what you have learned in terms of creating, formatting, and interpreting different kinds of graphs. If you have been working in Excel, how much have you increased your comfort with and confidence about using the graphing tools available to help your students get more our of their schoolyard study? How can you apply what you have accomplished today to the classroom? If time allows, feel free to take some of your classroom data and try creating graphs that will help you and your students interpret the results of your field sampling.

Please provide us with feedback through the post-workshop survey! – Thank you!