

Graphing Pedon Data

Procedure developed by William Wehmueller, Soil Scientist, Manhattan, Ks. 66503
785-776-5182, william.wehmueller@ks.usda.gov

A list of required items:

1. A digital photographic image of the pedon.
2. A digital photo editor.
3. EXCEL 97, earlier versions of EXCEL don't support this technique.

The default layout for a graph in EXCEL 97 (Figure 1) is typical of most graphing packages and standard scientific graphs. The default is a landscape layout with the horizontal axis as X (independent variable), and the vertical axis as Y (dependent variable).

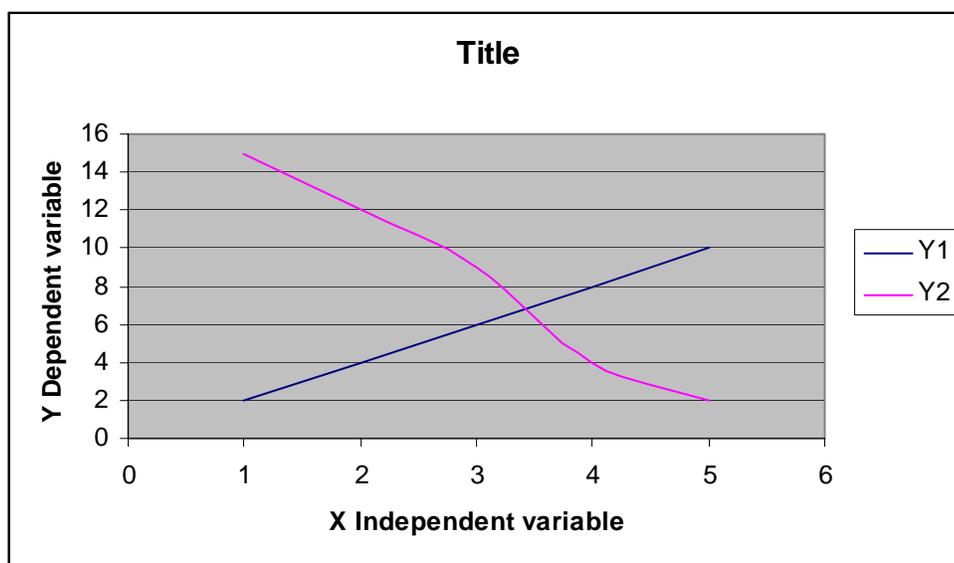


Figure 1. Default layout for graph using EXCEL chart utilities.

When graphing pedon data soil scientists typically want the independent variable (depth) on the vertical axis and the dependent variable (percent clay, percent sand, organic carbon, etc.) on the horizontal axis. EXCEL 97 allows you to override the default layout so the graph appears the way soil scientists typically think about and display pedon data. Data used in this example is shown in Table 1.

| top hz depth | bottom hz depth | Clay % | hz mid point |
|--------------|-----------------|--------|--------------|
| 0 | 5 | 30.5 | 2.5 |
| 5 | 10 | 31.2 | 7.5 |
| 10 | 24 | 32.1 | 17 |
| 24 | 57 | 49.2 | 40.5 |
| 57 | 79 | 44.3 | 68 |
| 79 | 95 | 37.0 | 87 |
| 95 | 114 | 33.5 | 104.5 |
| 114 | 132 | 33.9 | 123 |
| 132 | 160 | 35.8 | 146 |
| 160 | 208 | 35.6 | 184 |

Before plotting, decide what will be used on the vertical axis. The choices are top horizon depth, bottom depth, or mid point of the horizon. In this example **mid point** was chosen as this made the nicest looking chart. The data can be entered into any column but should be sorted in ascending order by depth as in table 1.

Begin by clicking on the **chart wizard** icon on the tool bar or select **Insert, chart** from the EXCEL menu. The chart type to select is **XY(Scatter)** with data points connected by smoothed lines (Figure 2). After making this selection and clicking on **Next >** at the bottom of the window, you will be asked to select the data ranges.

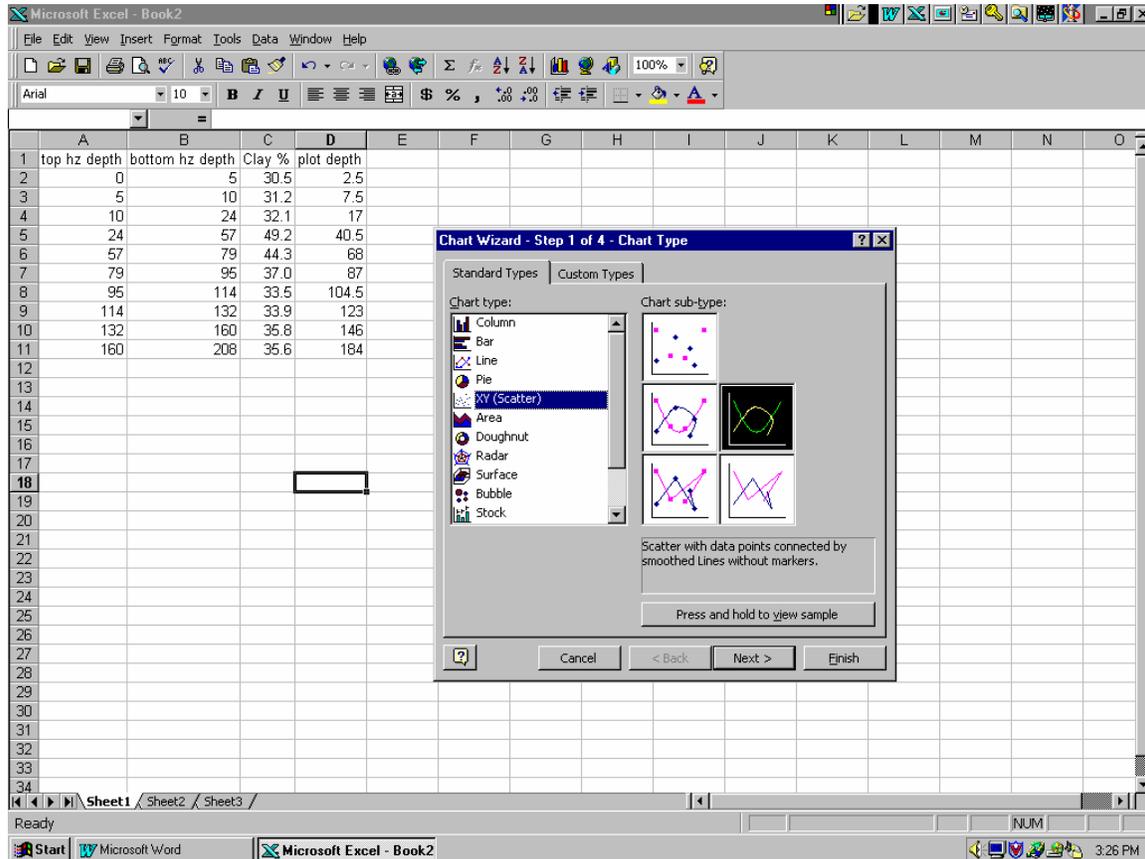


Figure 2. Selecting the chart type.

Step by step instructions for selecting data ranges are difficult to write because several different paths are possible and the EXCEL chart wizard takes different paths depending on where the cursor is and other assumptions that it makes about the data. In the window that pops up as step 2 of 4, click on the small chart icon where it is labeled **Data range**, (Figure 3) then select the data to be graphed. In this example it is column C1-D11 (Figure 3). Note that EXCEL plots the data in the left column selected as the X-axis (horizontal) and the right column selected as the Y-axis (vertical). If this is not the correct order for your data selecting the **Series** tab at the top of the chart window takes you to screens that allow you to change the order of the data series. In this example we are plotting only one series and that is percent clay. A second series, i.e. percent sand could also be added. Figure 1 is an example of a chart with two series plotted.

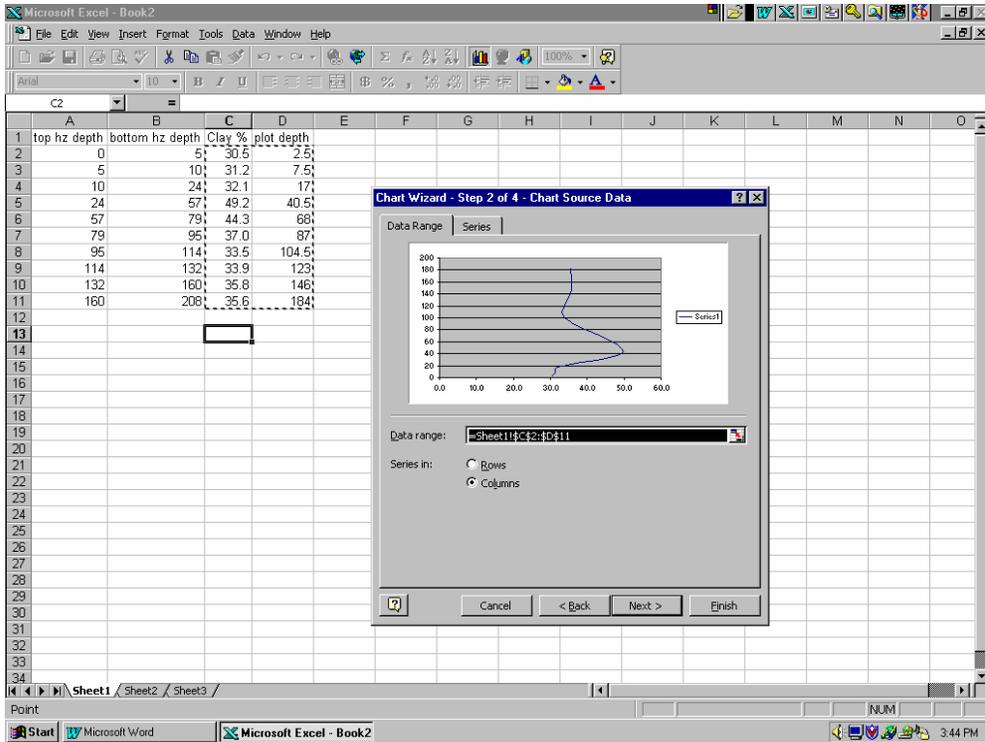


Figure 3. Selecting data step 2 of 4 using chart wizard.

Note that the Y-axis appears in the reverse order of the way soil scientist's plot with depth. This will be changed later. It is important that the soil property you are plotting is on the horizontal axis and the depth is on the vertical axis. Clicking **Next >** takes you to the window that allows you to add Titles, name the axes, show the legend, grid lines, and data labels (Figure 4). You may bypass this step or add some labels now, EXCEL allows you to change, add or subtract them later

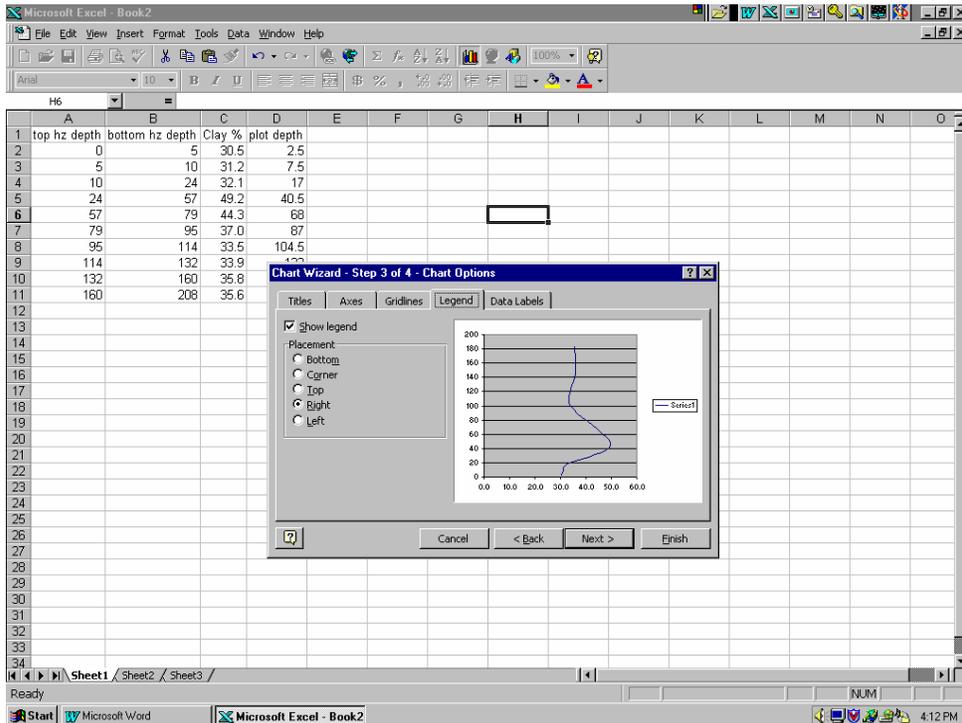


Figure 4. Step 3 of 4 adding titles, labels, and formatting options.

Click **Next >** to get to the fourth and final window of the chart wizard. This step allows you to choose if the chart will be added to the current sheet, or if a new sheet will be opened for the chart.

Once the chart is created as an object in the current sheet or a separate sheet, formatting of all elements can be done. The first step in formatting is to click in the chart to make it the active object, and then change the default layout by clicking **File, page setup, paper size, and portrait** from the EXCEL menu. The size of the chart can be adjusted by clicking and dragging the corner tabs on the chart.

The next step is to adjust and format the vertical axis. Place the mouse pointer directly over the vertical axis and **Right click**, a menu pops up with two choices, chose **format axis**. From the next window select the **Scale tab** and click the **Values in reverse order** box, (Figure 5) then click **OK**. This will change the orientation of the graph with the percent clay across the top and depth descending down the vertical axis (Figure 5).

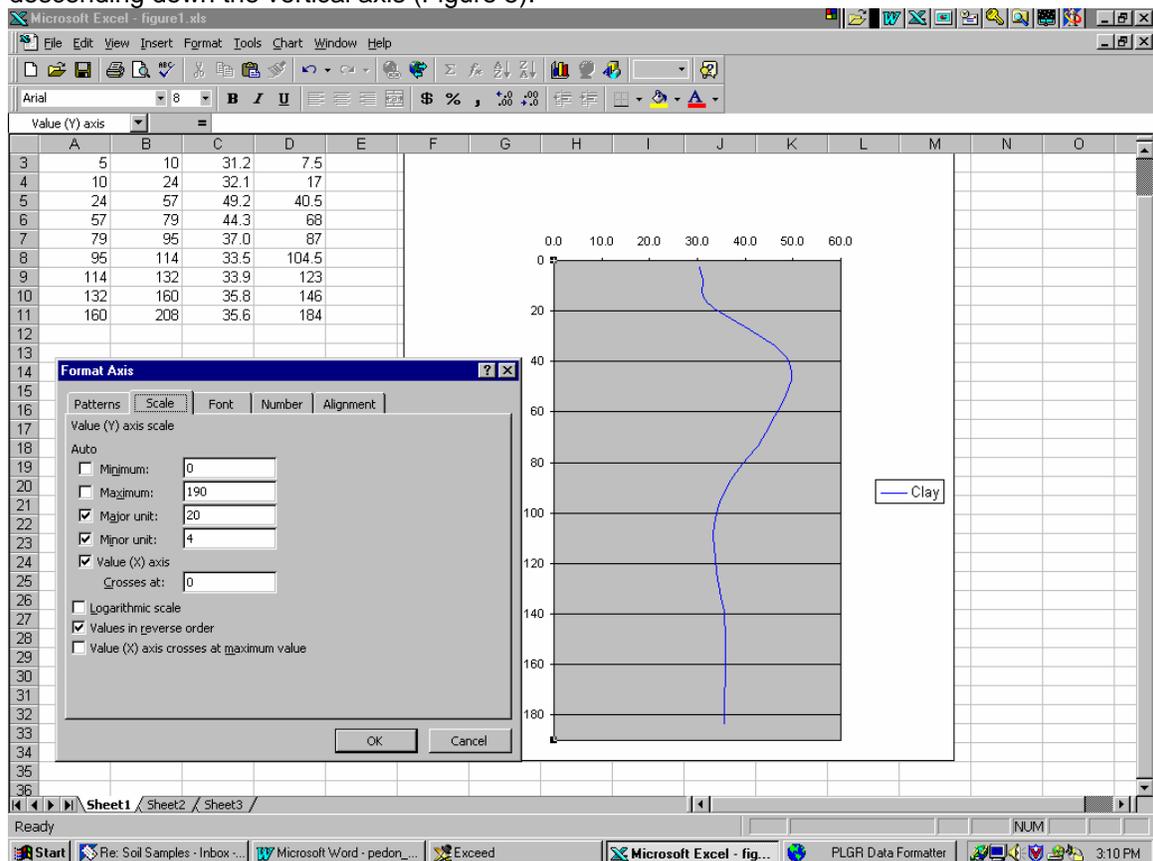


Figure 5. Format axis menu with vertical axis plotted in reverse order.

At this point the chart is ready to have the pedon photograph added as background. Using a photo editor the pedon photograph needs to be clipped so that the portion of the photo displayed is similar to the scale of the chart. Figure 6 is the original photograph of the example pedon, and figure 7 is the portion that was clipped and saved using the photo editor. Note that the clipped portion is from 0 to 190 cm and that the vertical axis on the EXCEL chart currently is from 0 to 200 cm. If the photograph had been clear to 200 cm the clipped portion should have included the full depth. Because the clip is only 190 cm, the scale of the chart will need to be adjusted.



Figure 6. Pedon photograph.



Figure 7. Clipped portion saved as separate file.

To insert the photo background **Right click** in the plot area of the chart, select **Format plot area**, select **fill effects**, select the **picture tab**, click on **select picture** (figure 8). EXCEL will open a box to allow you to find the file that has the pedon photograph you have prepared using the photo editor.

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|----|-----|--------|------|-------|-------|---|---|---|---|---|---|---|---|---|---|
| 1 | top | bottom | Clay | Depth | | | | | | | | | | | |
| 2 | | 0 | 5 | 30.5 | 2.5 | | | | | | | | | | |
| 3 | | 5 | 10 | 31.2 | 7.5 | | | | | | | | | | |
| 4 | | 10 | 24 | 32.1 | 17 | | | | | | | | | | |
| 5 | | 24 | 57 | 49.2 | 40.5 | | | | | | | | | | |
| 6 | | 57 | 79 | 44.3 | 68 | | | | | | | | | | |
| 7 | | 79 | 95 | 37.0 | 87 | | | | | | | | | | |
| 8 | | 95 | 114 | 33.5 | 104.5 | | | | | | | | | | |
| 9 | | 114 | 132 | 33.9 | 123 | | | | | | | | | | |
| 10 | | 132 | 160 | 35.8 | 146 | | | | | | | | | | |
| 11 | | 160 | | | | | | | | | | | | | |

Figure 8. Format Plot Area and selecting photograph for background.

Figure 9 is an example of the chart that is created. Note that because the scale of the chart goes to 200 cm and the photo only goes to 190 cm not everything is in alignment.

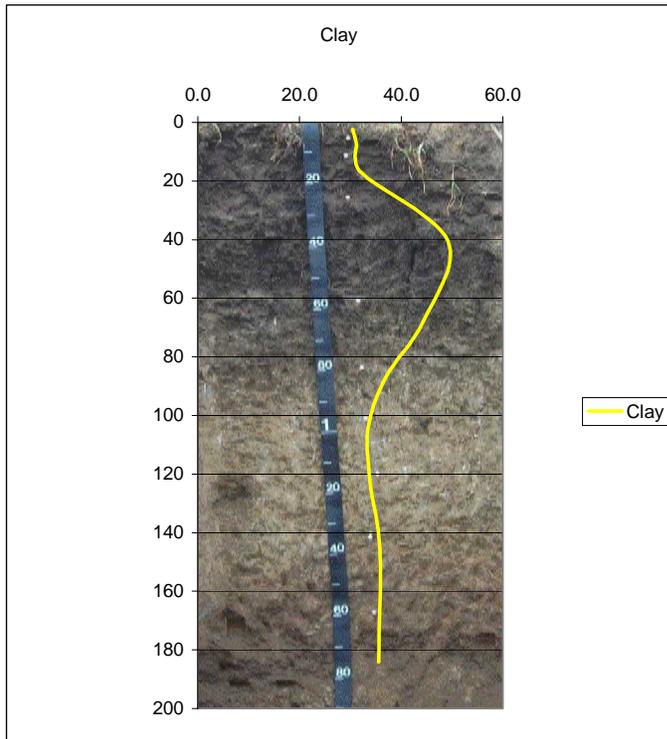


Figure 9. Chart with photo background. Note differences in scales.

To correct the misalignment **right click** on the vertical axis, select **format axis**, select the **scale tab**, and change the value in **maximum** box to 190 (Figure 10).

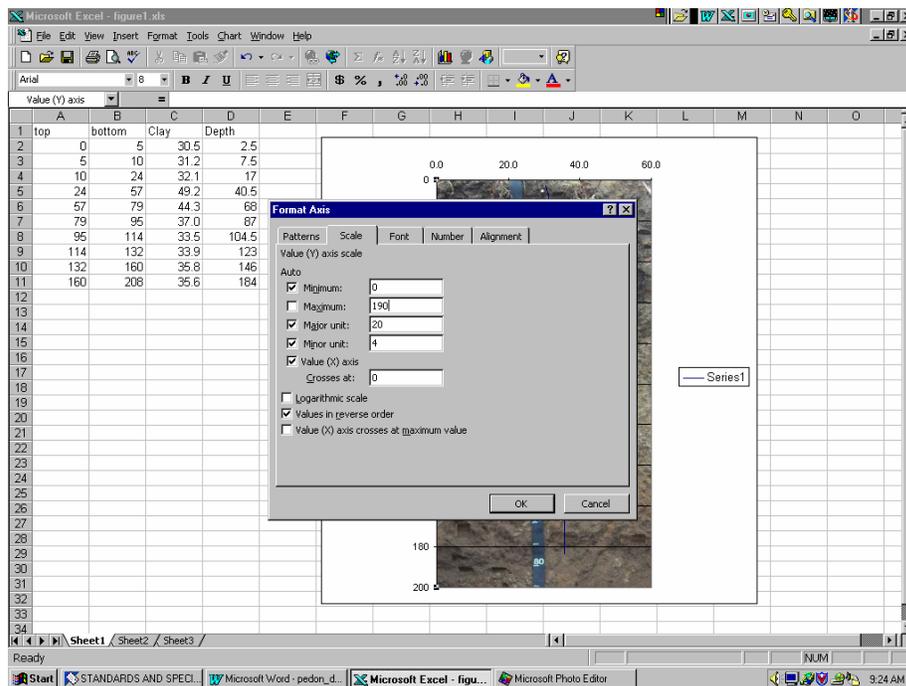


Figure 10. Adjusting the scale of the chart to match the scale of the pedon photograph.

Figure 11 is a complete chart with titles, axis labels, data labels, and series label. All of these features can be added, deleted, location changed or font changed by Right clicking in the plot area, or chart area and then selecting chart options or data source. The EXCEL or Office97 documentation also has guidance on these features.

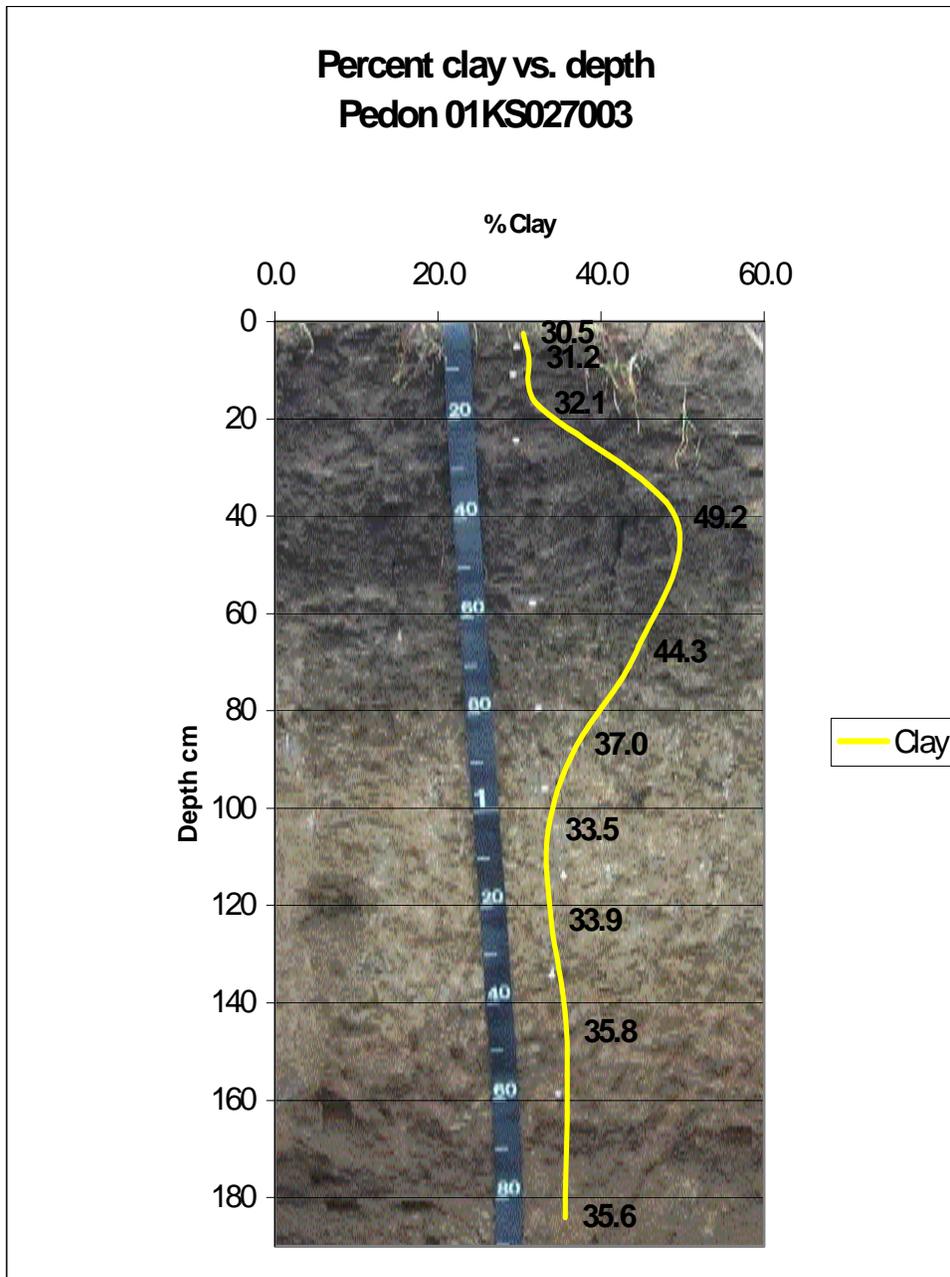


Figure 11. Completed chart with titles, axes, and data labeled.