

**Bio 112 Vegetation Analysis Lab Part 1**  
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**11/2/05**

Summary: We did an NMS (nonmetric multidimensional scaling) ordination to group 106 samples/plots by the similarity of their species composition. From the scree plot, we found we could best reduce the number of dimensions from 68 (the number of species) to 3 without too much information loss. These 106 plots also expressed various quantities of 17 environmental variables. Plots that were more similar to each other were arranged closer together in the 3D ordination space than more dissimilar plots.

Interpretation of results from biplot with Treelong as both the main matrix and second matrix

Whatever the three axes were of our 3D ordination space, the following species responded most strongly to them (as determined by a strong correlation (long red line) on the biplot in the direction of that axis, as well as a high r-value (above 0.3) after doing Statistics > Correlations with Main Matrix):

Axis 1: QUPR, ACRU, OXAR; Axis 2: QUAL, LIST, CACR, ULAL, OXAR; Axis 3: QUST, JUVI, FAGR, LITU

Interpretation of results from biplot with Treelong as the main matrix, and Envlong as the second matrix

The following environmental variables had a strong correlation to the three axes (as shown graphically, and also from a high r-value from Statistics > Correlations with Second Matrix):

Axis 1: (-) correlations for pH, Mn, and Ca-A; (+) correlation for Al (see graphic below)

Axis 2: (-) correlation for Dist-H2O and Elev; (+) correlations for Ca-A and Mg-A (see graphic below)

Axis 3: none of the env. variables had very strong correlations with this axis. The closest were Elev (0.277), Solar (0.297), and K-A (-0.339), which were all around 0.3 (a decent level of correlation).

**Right:** Dist-H2O (distance to water) was the most significant env. variable, judging from its correlation of -0.737 (very close to -1). It lines up almost exactly with Axis 2, and did a better job than any other env. variable at explaining the ordination groupings of plots. This means that as distance from water increases, this has more of an effect than any other variable on the species that will be found in those plots. Since species QUAL, LIST, CACR, and ULAL also strongly corresponded with Axis 2, this suggests these 4 species were most sensitive to distance from water.

What the axes might mean

Axis 2 might involve factors in the soil (water and nutrients) that control plant growth. The Ca-A and Mg-A lines fall along Axis 2 just as Dist-H2O does, and both these nutrients are as essential as water for plant growth. The Elev line might be explained by its link to soil moisture if, as elevation increases, we have the same effect on plant growth as increasing the distance to water.

Axis 1 might involve soil pH. I read that low soil pH can increase Mn and Al availability to toxic levels, which would explain why Mn and Al are associated with this axis. Interestingly, low pH also lowers Ca and Mg availability—perhaps this is why the Ca and Mg lines are skewed in the direction of the pH line.

The K-A line had the only correlation above 0.3 for Axis 3. Like Ca and Mg for Axis 2, it is another important plant nutrient.

