Taxonomy/Phylogeny of plants

Taxonomy describes a method of classifying organisms based on similarities or differences in their characteristics.

1. Find photos of corn, wheat and soybean plants or bring in examples from a field or greenhouse. Look at the leaves (vein patterns), the germinating seed (number of seed leaves), flower (reproductive parts) and seed locations, etc. Which two of these three plants have more similar characteristics?

	Leaves (vein pattern)	Germinating seed (seed leaves)	Flower (reproductive parts)	Seed location
corn				
soybean				
wheat				

Prior to the 1990's, we had no other method of classifying organisms except by grouping them in large categories, then grouping them into smaller and smaller ones until we got to genus and species. For example, the genus and species name of soybeans is *Glycine max*. (Because these are the scientific names, used in every language around the globe, they are italicized and the first letter of the genus name is always capitalized.)

The seven levels of classification include: kingdom, phylum, class, order, family, genus and species.

Activity:

Create a flyer for a plant (any plant from the agronomy, arboriculture, floriculture, forestry, horticulture, landscape, or orchard industry) of your choice to show its classification system. The flyer should include: each of the 7 levels of classification, meaning of each level of classification, common name, scientific name, and a picture.

Example:

Soybean Taxonomy

Kingdom- Plantae (plant)
Phylum- Magnoliophyta (flowering)
Class- Magnoliopsida (dicotyledon)
Order- Fabales (eudicots)
Family- Fabaceae (legume)
Genus- Glycine (soybean)
Species- max (soybean)

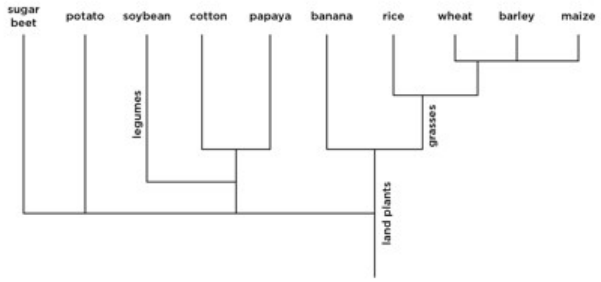
Common Name: Soybean
Scientific Name: Glycine max

2. Phylogeny is a method of looking at evolutionary relationships between organisms. Look at this website to see an explanation of a phylogenetic tree. Using the information from the table above (in #1), which two of the above would you think is more closely related to one another? Explain what evidence you are using to make your claim.

3. We can look at the evolutionary relationships between plants by looking at phylogenetic trees, a branched diagram which shows where species diverged from a common ancestor. Creating a phylogenetic tree can be done by looking at similar characteristics and determining which organisms are most alike. To learn how to make one, click here. Can you draw a phylogenetic tree with only the information we have gathered by observation?

AFNR Plants and Horticulture

Take a look at this phylogenetic tree . This is a bit more complicated than we need when discussing crop plants, but there are some other plants of interest on this tree as well. This tree is the result of being able to sequence DNA at a molecular level. Here is a simplified version:



The closer the plants are on the chart, the more closely related they are in evolutionary history.

Extension

Using the large graphic, answer the following questions.

4. Which crop plants are most closely related to bananas?

5. What larger group (clade) includes soybeans?

6. What larger group (clade) includes rice, wheat and maize?

The following resources describe the mapping of the “big three” genomes.

Scientists Trace Corn Ancestry from Ancient Grass to Modern Crop

http://www.nsf.gov/news/news_summ.jsp?cntn_id=104207

Mapping and Sequencing of Soybean Genome Paves the Way for Improved Soybean Crops

http://www.nsf.gov/news/news_summ.jsp?cntn_id=116209

Bread wheat’s large and complex genome is revealed

http://www.cshl.edu/news-a-features/bread-wheats-large-and-complex-genome-is-revealed.html