For the faculty:

I use this to introduce the students to Applied Learning Activities (ALAs). In this first review lesson the ALA’s are more about assessment than learning. After review lessons, the ALA’s become learning activities rather than assessment activities.

Administration. This activity can be administered as an in-class assignment or as a homework assignment. It can be assigned to groups or individuals depending upon the purposes. The students can turn in written reports in MS Word or PowerPoint. The latter are very good for motivating in-class discussions as long as the faculty ask only clarifying questions and provide positive suggestions. Remember it is important to demonstrate how you would develop such a report. I do this in *ALA report writing video.mp4*.

Motivation. Graduate students have a tendency to write much more than is necessary, hoping that the instructor will find the requested information somewhere in the report. They must learn early to write informative executive summaries.

For all of the ALA’s it is important to demonstrate how to accomplish the task with a related example.

For the first ALA, I demonstrate how I read and highlight information that is needed to meet the

 assignment using a .pdf document about Alan Robertson written by Trudy Mackay. I

 demonstrate how I use GOOGLE scholar to search the web for documents that are needed in the

 briefing. I then demonstrate how I read, highlight and extract information needed in the briefing

 document. I then demonstrate how I organize the briefing document into two paragraphs; one

for each aspect requested in the briefing.

**Purposes:**

**Keywords:**

**References:**

*Sweetpotato Breeding for CI CM*

Applied Learning Activity:

**How to choose which traits to select for based on variation available in the population and how traits are correlated**

Yada et al. 2010 Morphological Characterization of Ugandan Sweetpotato Germplasm

Multivariate statistical tools are useful for summarizing the variation (i.e., morphological or genetic) in a population. Principle Component Analysis (PCA) allows a breeder to identify the most variable traits and correlation analyses aid in understanding the relationships between traits. By understanding these relationships a breeder can prioritize which traits to select for to reach his/her breeding objectives.

PCA is helpful technique for identifying which traits best define how genotypes differ from each other and which traits are the most variable in a population. Correlation and regression analyses help to identify how traits are related. In a defined group of genotypes two traits are positively correlated if the values of both traits either go up or down together. Two traits are negatively correlated if the value of one trait goes up while the value of the other trait consistently goes down. Two traits are uncorrelated if their values do not change in relation to each other.

Because a breeder can only select a limited number of traits per cycle, correlation analysis is useful for identifying a prioritized list of descriptors, which will allow a breeder to reduce time/$ by concentrating only on a subset of traits.

Objectives:

1. Determine the variation that exists in the population for different morphological traits.
2. Determine the relationships that exist between the traits

1303 accessions were collected and characterized for 40 morphological traits as defined by the CIP/AVRDC/IBPGR. 1991. Descriptors of sweetpotato. In Z. Huamán (ed.) International board for plant genetic resources, Rome, Italy. The PROC STEPDISC procedure in SAS was used to concentrate the list down to 20 descriptors that were sufficient for differentiating the accessions.

Which traits displayed the most morphological variation (high Shannon Weaver diversity index, Table 1)? Which traits showed the best discriminating power to differentiate the accessions (Table 2, rank traits based on Eigenvectors, PC1 = plant pigmentation (petiole pigmentation, abaxial leaf pigmentation, predominant vine color, mature leaf color, predominant skin color, immature leaf color), PC2 = leaf lobes? A large number of traits >20 was required to explain the total variance indicating that some of the accessions were likely duplicates (28.4%). Which traits are correlated? Correlations were generally low or negative between storage root traits and vine traits, however some leaf traits were moderately correlated with storage root traits and could be a useful means of evaluating accessions in the absence of storage roots (Vine color/skin color 0.31, storage root thickness/type of leaf lobes 0.27, predominant skin color/mature leaf color 0.24 and immature leaf color 0.3 and petiole pigmentation 0.5)



