<u>Purposes</u>:

1. Help the students connect their mental framework for selecting more than one trait to actual field data.
2. Assure that the students do not do this without first understanding the sources of variation for each of the traits and understanding the correlations between the traits in multiple environments.

<u>Goal</u>:

Apply multiple trait selection to field trial data in a hybrid development program.

<u>Useful R commands</u>

- rm()
- attach()
- factor()
- lm()
- aov()
- summary()
- lsmeans()
- lmer()
- plot()
- write.csv()

<u>ALA</u>:

Forty-five (45) experimental hybrids and five check hybrids were evaluated in a replicated multi-environment trial (MET) consisting of two 50 plots per block at each of four environments. The experimental hybrids were created using a diallel and are labelled H01 – H45, while the check hybrids are labelled H46 – H50. Harvestable yield and plant height were evaluated in two row plots in a single year. The hybrids were assigned to the field plots using a randomized complete block design, where each block is represented as one of two replicates per location. The

data are in a file designated QG_Mod11_ALA11.2.csv. Assume that the environments accurately represent the market in which the hybrids could be sold. These environments may represent distinctive groups of homogeneous environments, or they may all be samples from a single homogeneous environment.

1. What is the correlation between traits 1 and 2?

2. Select the best five hybrids for trait 1.

3. Select the best five hybrids for trait 2.

4. Use independent culling to select hybrids from the two subsets created by selections from Q2 and Q3. Are there any hybrids that meet both criteria?

5. Create a selection index with equal economic value for both trait 1 and trait 2 and select the best five lines based on the selection index. Contrast and compare these hybrids trait values with the hybrids selected in Q4.

Try again assuming that protein is only ½ as important economically as yield. The selection index allows for a large amount of flexibility in decision making for cultivar development.