**How to do Statistics Analysis for Arabidopsis**.

**Analysis of Variance (ANOVA)**

We are going to analyze our data using an ANOVA. The basic premise is that we are comparing the amount of variation between treatments ( the different % hydration for example) than within treatments (the plants in one particular % hydration).

We are doing a two way ANOVA since we considered % hydration AND time soaking. But there could be an interaction between these factors. Maybe the time soaking makes more of a difference at lower % hydrations….

We are looking for a statistically significant difference between our treatments. This means we can only conclude that there is a difference between our treatments if there is a less than 5% chance of being wrong. (p< .05)

**How to Calculate**

1. Open up the data sheet with either fruit or rosette diameter data
2. Add in the XL Miner Toolpak
* Click on Add-ons and from drop down menu, select ‘’Get Add-on’’



* Find and select XL Miner Toolpak and it will be available to you in the drop down menu.
1. XL Miner Toolpak
* Now that you have added it into your Google Sheets, select XL Miner from the dropdown menu ‘’Add-ons’’.
* You will see the menu for this Add-on on the left side of the screen.
* Click on Two Way ANOVA with replication
* That will open up and look like this below



1. Doing ANOVA
* Input Range: select the cells that contain the data – make sure to include the column with % hydration and the header with time.
* Rows per sample: this is the number of samples for each treatment and should be 18
* Output range: when you click in this box, it automatically puts the range that you selected for your data. This means it will paste your ANOVA table over your data- which is weird and I don’t like. Make sure to click in an empty cell that has lots of empty space above and below so that you can read your output easily.
1. Interpreting your ANOVA Summary
* This is super useful since it gives you the average for each of your treatments. You can take this information and use that to make your bar graphs.
* For example, I can graph the average fruit number for 20-30% at 5 min, 10 min, etc



1. Interpreting your ANOVA table;
* Sample= the rows = % hydration
* Column = time
* P-value = is the chance that we are wrong if we conclude that there is a significant difference between treatments. If it is less than .05, then we conclude there is a difference.
* In this case below, you can see that there is a significant difference for Sample (% hydration), Column (Time) and Interaction.
* That doesn’t tell us which treatments differed – for that we’ll need another statistical test called a Tukey’s t-test.
* I will do that and distribute in class.