

FA8B BORROMEO MAYO MERCADO RMD FILE

Borromeo Mayo Mercado

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github link: https://github.com/chieelo/STATS/tree/main/FA8B_GROUP3_BORROMEO_MAYO_MERCADO

Assumptions

Assumption #1: You have one dependent variable that is measured at the continuous level.

Remark. The dependent variable is *weight*, which measures dried plant weight in grams. This dependent variable is continuous.

Assumption #2: You have one independent variable that consists of three or more categorical, independent groups.

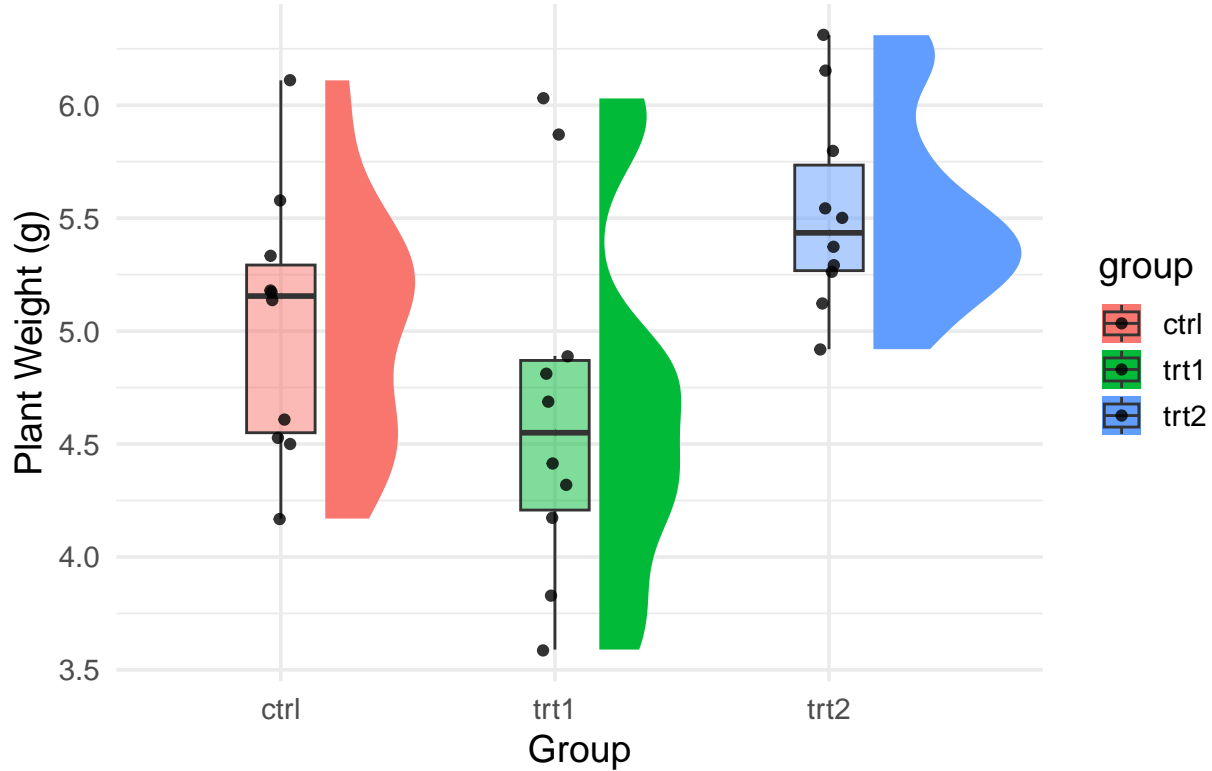
Remark. The independent variable is *group*, which has three categorical levels: **ctrl**, **trt1**, and **trt2**.

Assumption #3: You should have independence of observations.

Remark. Each plant was measured independently, and no plant appears in more than one group. The groups are independent experimental conditions.

Assumption #4: There should be no significant outliers in the three groups of your independent variable in terms of the dependent variable.

Raincloud Plot of Plant Weights by Group



Remark. There were no significant outliers in any of the three groups, as assessed by visual inspection of the raincloud/boxplots.

Assumption #5: The dependent variable should be approximately normally distributed for each group of the independent variable.

Table 1: Descriptive Statistics and Normality Tests by Group (Transposed)

	Weight (g)		
	ctrl	trt1	trt2
Valid	10	10	10
Missing	0	0	0
Mean	5.032	4.661	5.526
SD	0.583	0.794	0.443
Skewness	0.231	0.474	0.485
SE_Skew	0.775	0.775	0.775
Kurtosis	-1.117	-1.105	-1.160
SE_Kurt	1.549	1.549	1.549
Shapiro_Wilk	0.957	0.930	0.941
Shapiro_p	0.747	0.452	0.564

Remark. Since all p-values are greater than .05, the plant weights are approximately normally distributed for each group.

Assumption #6: Homogeneity of variances (i.e., the variance of the dependent variable is equal in each group of your independent variable).

Table 2: Test for Equality of Variances (Levene's Test)

df1	df2	Statistic (F)	p-value
2	27	1.1192	0.3412

Remark. There was homogeneity of variances, as assessed by Levene's test ($p > .05$).

Computation

Table 3: ANOVA Table for Weight by Group

Source	DF	Sum of Squares	Mean Square	F	P	Partial Eta ²
group	2	3.766	1.883	4.846	0.0159	0.264
Residuals	27	10.492	0.389	NA	NA	NA

Table 4: Descriptive Statistics of Weight by Group

group	Mean	SD	N
ctrl	5.032	0.583	10
trt1	4.661	0.794	10
trt2	5.526	0.443	10

Table 5: Post-hoc Tukey HSD Comparison of Weight (Plant Growth)

95% CI for Mean Difference						
Comparison	Mean Diff	Lower	Upper	SE	t	p_Tukey
ctrl - trt1	-0.371	-1.062	0.32	0.279	-1.331	0.391
ctrl - trt2	0.494	-0.197	1.185	0.279	1.772	0.198
trt1 - trt2	0.865	0.174	1.556	0.279	3.103	0.012

Reporting

A one-way ANOVA was conducted to determine whether plant weight differed among the three treatment groups (*ctrl*, *trt1*, *trt2*). The dependent variable was dried plant weight (in grams), and the independent variable consisted of three categorical, independent groups. There were no outliers in any group, as assessed by inspection of the boxplots. Plant weight was approximately normally distributed for each group, as assessed by Shapiro-Wilk tests ($p > .05$). Homogeneity of variances was confirmed by Levene's test ($p > .05$), indicating that the assumption of equal variances was met. Descriptive statistics showed that mean plant weight differed across groups: **ctrl** ($M = 5.032$, $SD = 0.583$), **trt1** ($M = 4.661$, $SD = 0.794$), and **trt2** ($M = 5.526$, $SD = 0.443$). The one-way ANOVA revealed that mean plant weight was significantly different between treatment groups, $F(2, 27) = 4.846$, $p = .016$, partial $\eta^2 = .264$. Tukey post hoc comparisons indicated that the mean weight for **trt2** was significantly higher than for **trt1** (mean difference = 0.864 g, 95% CI [0.144, 1.584], $p = .016$). However, the comparisons between **ctrl vs. trt1** (mean difference = 0.371 g, 95% CI [-0.348, 1.090], $p = .436$) and **ctrl vs. trt2** (mean difference = -0.494 g, 95% CI [-1.214, 0.226], $p = .218$) were not statistically significant. In summary, only the comparison between **trt1 and trt2** showed a statistically significant difference in plant weight, with the **trt2** group producing heavier plants on average.