

Practice: Using the One-Way ANOVA Task to Perform Post Hoc Pairwise Comparisons

Consider the analysis of the **garlic** data set. In the previous exercise, you used PROC GLM to perform one-way ANOVA, and found that there was a statistically significant difference among mean garlic bulb weights for the different fertilizers. Now, perform a post hoc test to look at the individual differences among means

1. Use the One-Way ANOVA task to conduct pairwise comparisons with an experimentwise error rate of $\alpha=0.05$. (Use the Tukey adjustment.)

1. In the Navigation pane, select **Tasks and Utilities**.
2. Expand **Tasks**.
3. Expand **Statistics** and open the **One-Way ANOVA** task.
4. Select the **stat1.garlic** table.
5. Assign **BulbWt** to the Dependent variable role and assign **Fertilizer** to the Categorical variable role.
6. On the OPTIONS tab, under HOMOGENEITY OF VARIANCE, use the Test drop-down list to select **None**, and clear the check box for **Welch's variance-weighted ANOVA**.
7. Under COMPARISONS, use the drop-down list for Comparisons method and select **Tukey** for Tukey's HSD.
8. Under PLOTS, use the Display plots drop-down list to select **Selected plots**, and then select **LS-mean difference plot**. Clear all other check boxes.
9. Run the task.

Here are the [results](#).

2. Which types of fertilizer are significantly different?

The Tukey comparisons show significant differences between fertilizers 3 and 4 ($p=0.0020$) and 1 and 4 ($p=0.0058$).

3. Modify the task to use level 4 (the chemical fertilizer) as the control group and perform a Dunnett's comparison with the organic fertilizers to see whether they affected the average weights of garlic bulbs differently from the control fertilizer.

To compare the output for the three different comparison methods, rerun the task with different comparison methods.

1. On the OPTIONS tab, under COMPARISONS, select **Dunnett two-tail** as the Comparisons method, and select **4** as the Control level.
2. To include the control plot in the output, under PLOTS, use the Display plots drop-down list and select **Default plots**.
3. Click **Run**.

Here are the [results](#).

4. Which types of fertilizer are significantly different?

The Dunnett comparisons show the same pairs as significantly different, but with smaller p -values than with the Tukey comparisons (3 versus 4 $p=0.0011$, 1 versus 4 $p=0.0031$). This is due to the fact

that the Tukey adjustment is for more pairwise comparisons than the Dunnett adjustment.

5. **Challenge:** Perform unadjusted tests of all pairwise comparisons to see what would happen if the multi-test adjustments were not made.

1. For unadjusted tests, on the OPTIONS tab, under COMPARISONS, choose **Least significant difference (LSD)** as the Comparisons method.
2. Click **Run**.

Here are the [results](#).

6. How do the results compare to what you saw in the Tukey adjusted tests?

The unadjusted (t test) comparisons have smaller p -values than they had with Tukey adjustments. One additional comparison has a p -value below 0.05 (2 versus 3).

Hide Solution