



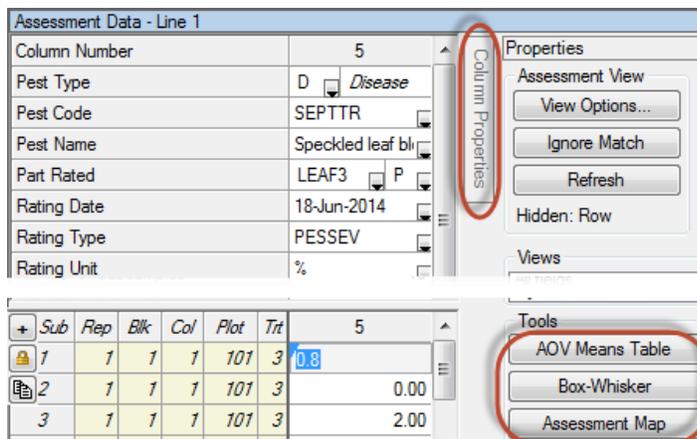
Recommended Assessment Review Methods

Recommended methods to review assessment data columns are located in **Properties** panel of the Assessment Data editor:

- **Column Properties** sub-panel
- **Tools** section of Properties panel

Recommended practices are to:

- Review new assessments while still **at trial site**, to most efficiently verify whether any unusual values may be from a data entry mistake or a possible site (non-treatment) effect.
- Use **Column Properties** to review for entry mistakes or violations of AOV assumptions
- Use **Tools** for detailed review:
 - AOV to fully analyze assessments, and verify if observed treatment differences are supported by analysis.
 - Box-Whisker graph to review treatment stability and visualize treatment differences.
 - Assessment Map to identify differences that may be site-linked rather than treatment-linked.



To display the Assessment Data editor: open a trial, and on Navigation Bar choose Assessment Data. The Properties panel should automatically open.

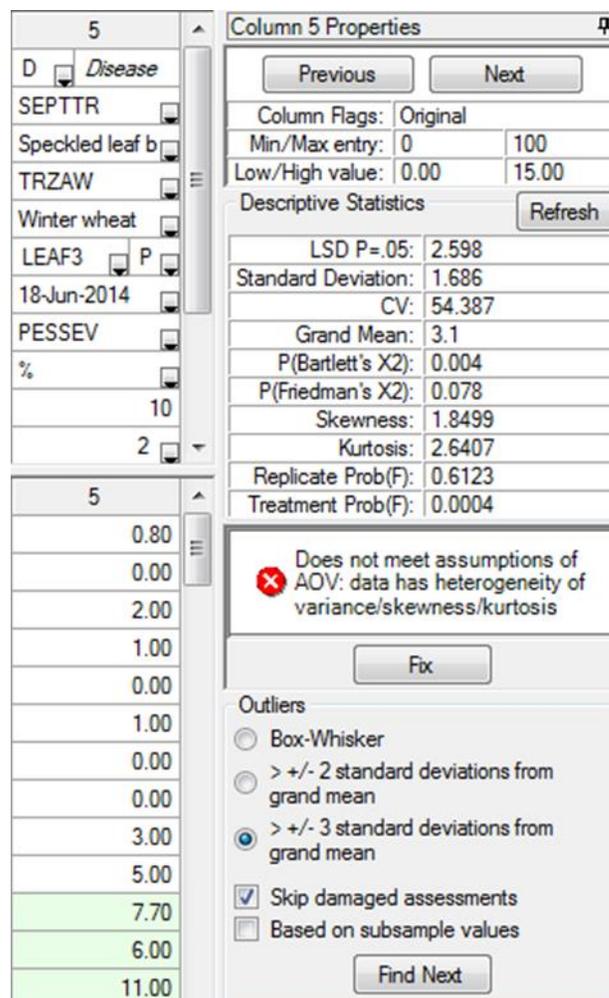
Note: if the Properties panel displays as a closed tab then click once on the Properties tab to open the panel, and then click once on the auto-hide pin  to lock panel in an open  position.



By default, the **Column Properties** sub-panel is **closed**. Use the method above to also lock this panel open.

Following is an overview of the assessment data review tools:

- 1) **Column Properties** panel provides:
 - a) Overview of data entered in current data column.
 - i) Previous/Next buttons to move between columns
 - ii) Whether data is:
 - Original =directly entered into a data column
 - Calculated =created using a data transformation formula
 - Changed =an unsaved change in data column
 - iii) Range of data values:
 - Min/Max =data limits that are active for column
 - Low/High = smallest and largest values present in column, including subsamples (if present)
 - b) Refresh button to recalculate a column after edits.
 - c) Descriptive statistics from full analysis of data column.
 - i) Least Significant Difference between treatment means at current AOV significance level
 - ii) Standard Deviation and Coefficient of Variation calculated from AOV residual error
 - iii) Grand Mean =mean across all treatments.



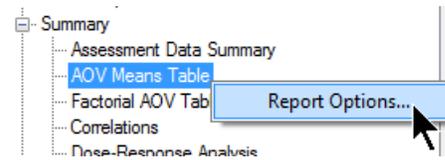
- d) Whether data violates any AOV assumptions.
 - i) $P(\text{Bartlett's } X^2)$ =evidence that at least one treatment has a different variance, thus violating AOV assumption that each treatment has approximately the same variance.
 - ii) $P(\text{Friedman's } X^2)$ =evidence that at least one treatment is significantly different based on Friedman's method for randomized blocks
 - iii) Skewness and Kurtosis =results of normality tests, showing evidence that data distribution is "skewed", or that peak of data distribution is flatter or sharper than a normal distribution.
- e) A warning panel when data violates assumptions of AOV, with a Fix button to use automatic corrections (data correction transformation, or exclude one: check treatment, other treatment, or replicate).



f) Search tool to find statistical outliers according to different outlier tests and options.

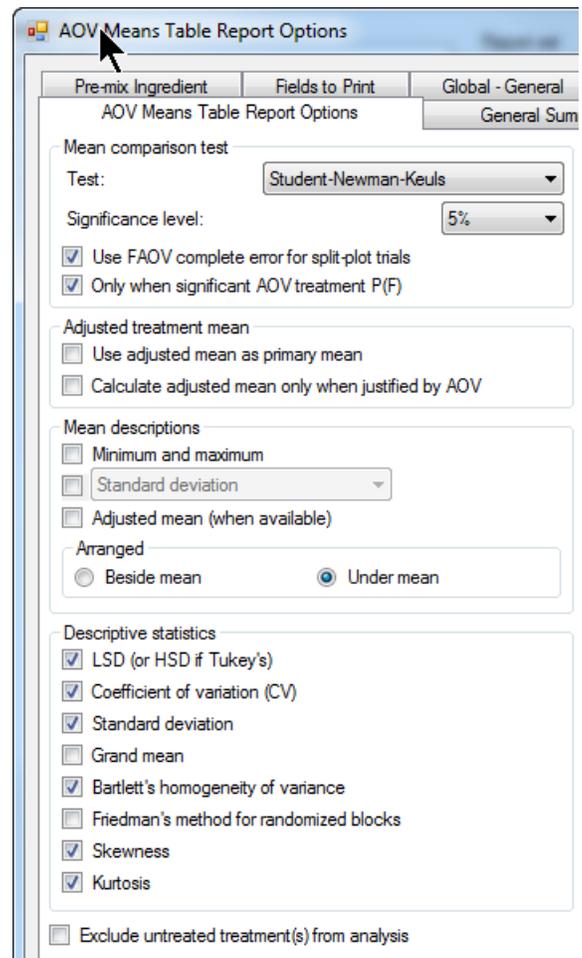
2) **AOV Means Table** displays preview of the AOV Means Table report beginning at the current data column, using current AOV Means Table Report Options settings. To change AOV Means Table report options:

- a) Click the Printer icon on toolbar (or click File - Print Reports) to display Print Reports dialog.
- b) Right-click on AOV Means Table report and select Report Options.
- c) Change report options as desired. Here are recommended defaults to use:



These defaults will:

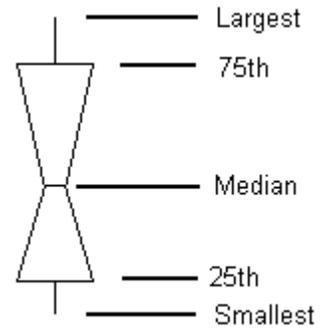
- i) Use a mean comparison method that maintains the selected significance level regardless of how many treatments are in the trial.
- ii) Performs a "protected" mean comparison test, so mean comparisons are only performed when Treatment P(F) indicates that "at least one treatment appears to be significantly different".
- iii) Tests for heterogeneity, skewness, or kurtosis. Any of these indicate that data violates assumptions for analysis of variance, and should be corrected to ensure adequate precision from the mean comparison test.



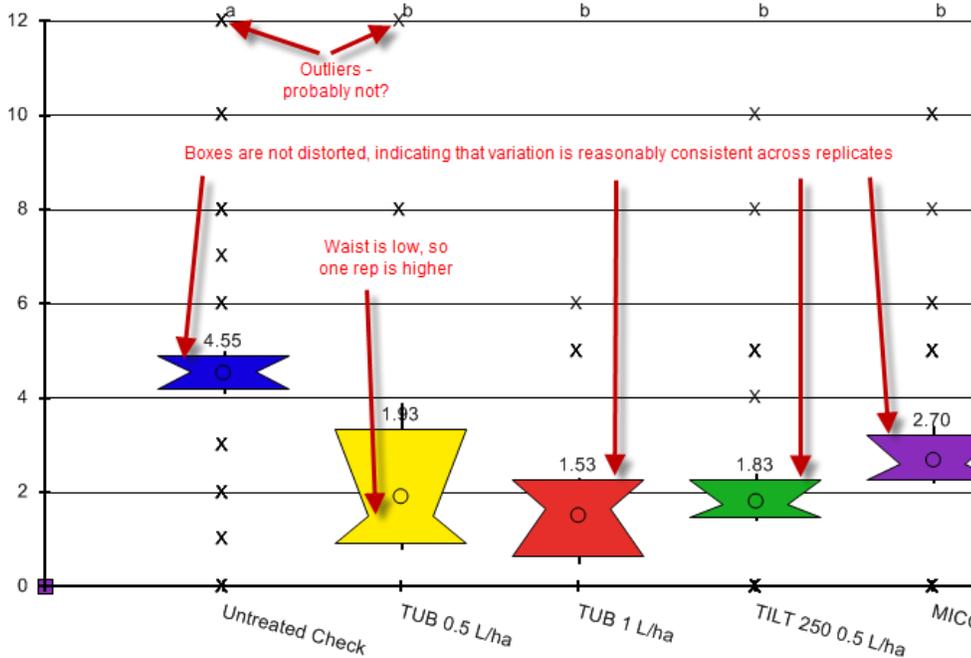
Pest Name	Speckled leaf >
Part Rated	LEAF3 P
Rating Date	18-Jun-2014
Rating Type	PE SSE V
Rating Unit	%
Number of Subsamples	10
Trt-Eval Interval	15 DA-B
Trt Treatment	Rate Appl
No. Name	Rate Unit Code
	5*
1 Untreated Check	ABC
8.25 a	
2 Tub	0.5 l/ha ABC
1.83 b	
3 Tub	1 l/ha ABC
1.46 b	
4 Tilt 250	0.5 l/ha ABC
2.30 b	
5 Mico 60 Fungol	1.5 l/ha AB
1.67 b	1.25 l/ha C
LSD P=.05 (% mean diff)	2.598 (84%)
Standard Deviation	1.686
CV	54.39
Bartlett's X2	15.5
P(Bartlett's X2)	0.004*
Skewness	1.8499*
Kurtosis	2.6407*
Minimum Replicates (power = 80)	2
Largest Mean Difference (% mean diff)	6.785 (219%)
Replicate F	0.625
Replicate Prob(F)	0.6123
Treatment F	11.778
Treatment Prob(F)	0.0004

3) **Box-Whisker** displays a box-whisker graph for the current data column using current graph option settings.

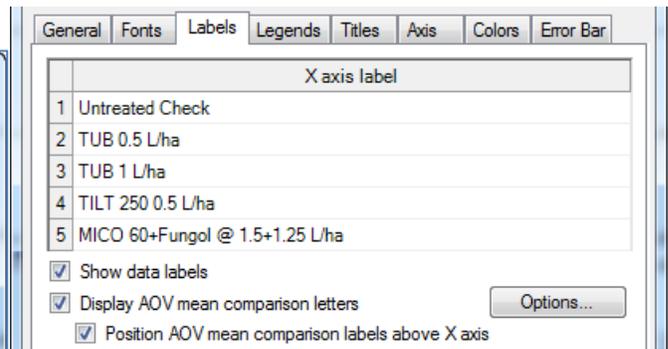
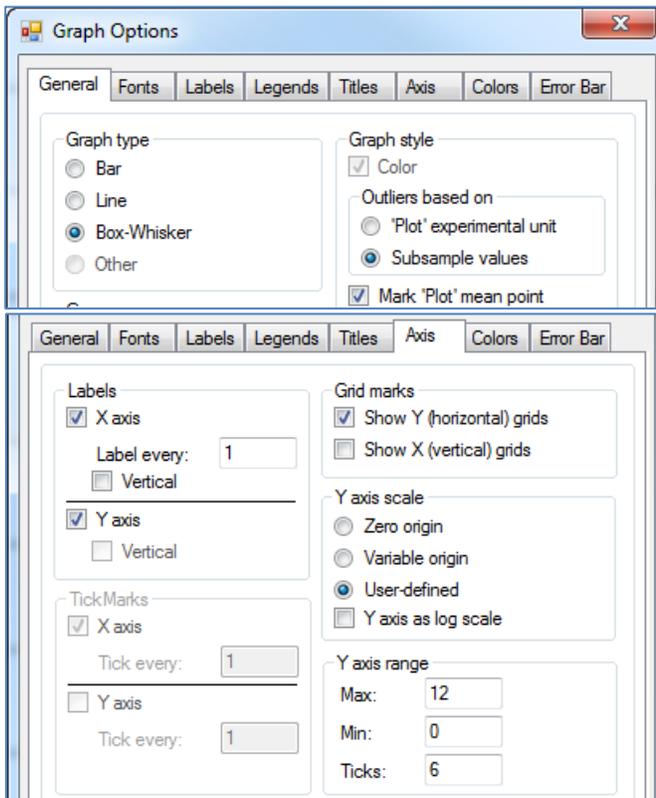
This graph type shows the "spread" of treatment data around the median, using a "box" and "whiskers" to break down each data group by percentiles. The **box** extends from 25th to the 75th percentile and is divided by the median. The **whiskers** extend from ends of the box to the largest and smallest non-outlier values. An **outlier** is a point that lies outside of the box by more than 1.5 times the height of the box, and is indicated by "x" on the graph.



The example below is from data column number 3 in example trial G-All7_Fung:



Options used to create this graph are:

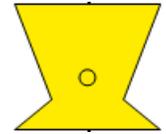


Benefits of using these option settings:

- Display subsample values that are possible "outliers", outside of box by > 1.5 times box height.
- Display treatment mean as "O" on box.
- Display mean values on the graph.
- Mean comparison letters above top axis.
- Y grid lines make it easier to read value of positions within the graph.
- Scale graph to show all possible outliers within boundaries of the graph.

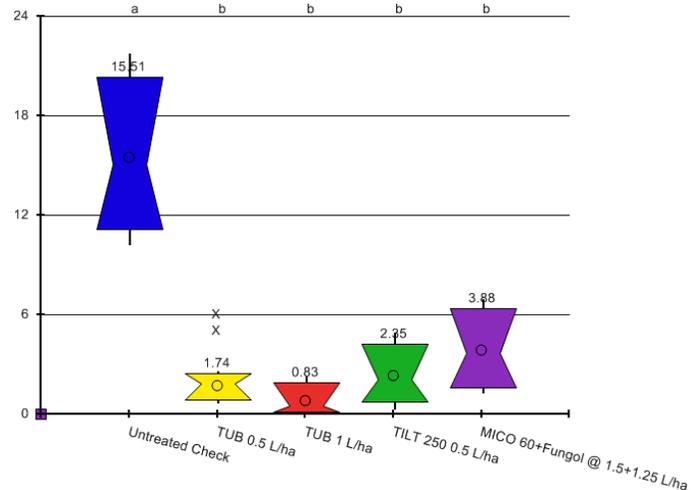
General benefits of using a box-whisker graph to review data are:

- a) Box height shows amount of variability within a treatment, thus is a measure of assessment consistency or "stability" of each treatment.
- b) Waist position indicates whether variability is skewed, when one replicate is somewhat higher or lower than others. For example, when waist is "low", then a value in one of the replicates is somewhat higher than in other replicates. The box at right is treatment 2 from data column number 3 in example trial G-All7_Fung.



- c) Provides a visual mean comparison, since treatments where boxes overlap are probably not significantly different.
- d) Simplest method to identify heterogeneous treatments, indicated when height of treatment boxes are substantially larger or smaller than other treatments.

In the example at right, the box for "Untreated check" treatment 1 in data column 7 is much higher than the other 4 treatments. Bartlett's homogeneity test for data column 7 indicates 96% chance of heterogeneity, with significant skewness and kurtosis (non-normality).



- 4) **Assessment Map** displays assessment data values on a trial map, to help identify whether assessment differences may be influenced by "spatial effects" that can occur from variations within the trial site.

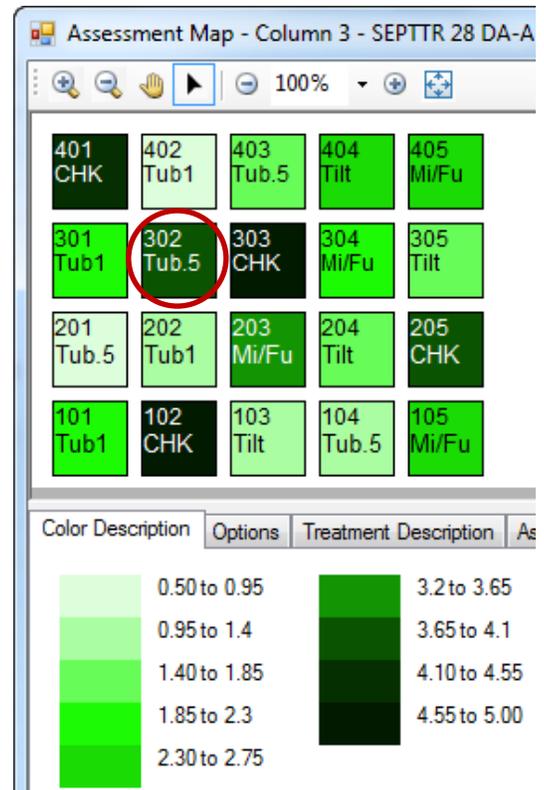
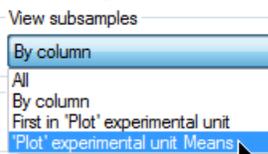
Differences in assessment values are indicated by color intensity. Lower values display in lighter colors than higher values. Select "Color description" tab to display a color key showing range of assessment values that are represented by each color.

For example, if crop yields seem consistently lower in one corner of a trial, it may indicate a lower quality soil in that portion of the trial. Spatial effects can also occur from an underground drainage tile line below a portion of the trial, or a variation in pest densities across the trial.

To help identify why the box for treatment 2 in data column 3 is distorted, display the assessment map for data column 3. Notice that the value for treatment 2 "Tub.5" in replicate 3 is substantially darker than in the other replicates. It is likely that replicate 3 is causing the distorted box on this graph.

Confirm this by changing the View Options setting "View subsamples" to "Plot experimental unit Means", sorting assessment data by treatment, and then reviewing treatment 2 for data column 3:

Rp	Bk	Col	Plot	Trt	
					3
1	1	4	104	2	
2	2	1	201	2	
3	3	2	302	2	
4	4	3	403	2	



Notice that the value in replicate 3 is more than twice the value in other replicates. Keep in mind that these values are all quite low, so while a difference of > 2% is **measurable**, for this situation it is **not meaningful**.