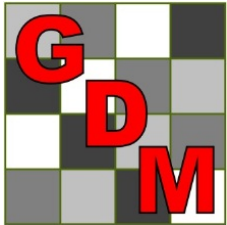


ARM Trial Management for 2016



Gylling Data Management, Inc.

Assessment Data Editor

Assessment Data view to hide data columns in which there are no differences between treatments

The screenshot shows the 'Assessment Data Editor' interface with the 'Assessment Data View' tab selected. On the left, a 'Column filter' section lists several columns: Prompt, Crop Code, BBCH Scale, Crop Scientific Name, Crop Name, and Crop Variety. Each column has a corresponding checkbox in the 'Visible' column. The 'Crop Code' and 'Crop Name' checkboxes are checked. On the right, there are two dropdown menus: 'Data origin' and 'Entry status', both set to 'Both'. At the bottom, a checkbox labeled 'Hide columns with no treatment differences' is checked and highlighted with a red oval.

Assessment Data Editor

Before:

	1	2	3	4
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SEPTTR	<input checked="" type="checkbox"/>
	LEAF <input checked="" type="checkbox"/> C	PLANT <input checked="" type="checkbox"/> C	LEAF3 <input checked="" type="checkbox"/> P	LEAF3 <input checked="" type="checkbox"/> P
	Jul-15-2014	Jul-15-2014	May-13-2014	Jun-18-2014
	PHYGEN	VIGOR	PESSEV	PESSEV
	%	%	%	%

Plot	Trt	1	2	3	4
101	3	0	100	1.00	0.80
102	1	0	100	10.00	7.70
103	4	0	50	1.00	1.10
104	2	0	100	0.00	1.20
105	5	0	100	10.00	1.70
201	2	0	100	0.00	1.20
202	3	0	100	2.00	0.90
203	5	0	100	0.00	3.30
204	4	0	100	5.00	1.70
205	1	0	100	3.00	9.50

After:

	3	4	5	
	SEPTTR	SEPTTR	SEPTTR	ZZ
	LEAF3 <input checked="" type="checkbox"/> P	LEAF3 <input checked="" type="checkbox"/> P	LEAF2 <input checked="" type="checkbox"/> P	LE
	May-13-2014	Jun-18-2014	Jul-2-2014	Jul
	PESSEV	PESSEV	PESSEV	AR
	%	%	%	%A

Plot	Trt	3	4	5	
101	3	1.00	0.80	0.40	20.0
102	1	10.00	7.70	9.90	10.0
103	4	1.00	1.10	1.60	10.0
104	2	0.00	1.20	0.00	80.0
105	5	10.00	1.70	7.40	0.00
201	2	0.00	1.20	1.20	20.0
202	3	2.00	0.90	0.10	20.0
203	5	0.00	3.30	2.90	0.00
204	4	5.00	1.70	3.00	70.0
205	1	3.00	9.50	16.00	0.00

Properties

Assessment

View Options...

Visible Col 8/10

Refresh

Hidden: 2 Col, Row

All values the same or missing/blank (50 in column 2 is "damaged" so is missing)

Assessment Data Editor

	3	4	5	
SEPTTR	<input checked="" type="checkbox"/>	SEPTTR	<input checked="" type="checkbox"/>	SEPTTR
LEAF3	<input checked="" type="checkbox"/> P	LEAF3	<input checked="" type="checkbox"/> P	LEAF2
May-13-2014	<input checked="" type="checkbox"/>	Jun-18-2014	<input checked="" type="checkbox"/>	Jul-2-2014
PESSEV	<input checked="" type="checkbox"/>	PESSEV	<input checked="" type="checkbox"/>	PESSEV
%	<input checked="" type="checkbox"/>	%	<input checked="" type="checkbox"/>	%

Properties

Assessment

View Options...

Visible Col 8/10

Refresh

Hidden: 2 Col, Row

Click this "Visible Col" button to choose between displaying:

- All data columns, or
- A view that temporarily hides some columns

Plot	Trt	3	4	5	
101	3	1.00	0.80	0.40	20.0
102	1	10.00	7.70	9.90	10.0
103	4	1.00	1.10	1.60	10.0
104	2	0.00	1.20	0.00	80.0
105	5	10.00	1.70	7.40	0.00
201	2	0.00	1.20		
202	3	2.00	0.90		
203	5	0.00	3.30		
204	4	5.00	1.70		
205	1	3.00	9.50		

Column filter

Prompt	Match	Sort	Visible
Part Rated	(All)		<input checked="" type="checkbox"/>
Rating Date	(All)		<input checked="" type="checkbox"/>
Rating Time	(All)		<input type="checkbox"/>
Rating Type	PESSEV		<input checked="" type="checkbox"/>
Rating Unit	(All)		<input checked="" type="checkbox"/>
Sample Size, Unit	(All)		<input type="checkbox"/>

Clear Clear Show All Hide All

☐ Display sort as tabs

Data origin: Original

Entry status: Data

☒ Hide columns with no treatment differences

☐ Ignore match

Reports

Option to:

- Change the order of treatment fields on reports, and
- Save this order into report sets, to easily use the same treatment order in future reports

Trt No.	Treatment Name	Rate	Appl Rate Unit	Code Plot	
4	Tilt 250	0.5 l/ha	ABC	103	50.0

Trt No.	Appl Code	Treatment Name	Rate	Appl Rate Unit	Code Plot	
4	ABC	Tilt 250	0.5 l/ha	103	50.0	

Summary Reports

Option to merge assessment data headers over columns having the same information

General Summary Report Options

Fields to Print: General Summary | Global - General | Global - Page Heading | Global - Page Footer

Assessment data header rows

☒ Merge data headers across columns with identical entries

Post Name e data headers across columns with identical es Rating Date Rating Type Rating Unit Days After First/Last Applic. Trt-Eval Interval ARM Action Codes			Speckled leaf blotch of wheat						
			Winter wheat						
	LEAF C		PLANT C				LEAF3 P		
			Jul-15-2014				May-13-2014		
	PHYGEN		VIGOR				PESSEV		
					%		%UNCK		
			91 7				28 28		
			7 DA-C				28 DA-A		
ARM Action Codes						TAB[3]			
Trt Appl Treatment		Rate							
No.	Code Name	Rate Unit	Plot	1	2	3	4		
4	ABC Tilt 250	0.5 l/ha	102	0.0	100.0	5.00	0.00		
			205	0.0	100.0	4.10	0.00		
			303	0.0	100.0	4.60	0.00		
			401	0.0	100.0	4.50	0.00		
			Mean =	0.0	100.0	4.55	0.00		

Assessment Data Summary Report

New options for displaying extended 'plot' experimental unit description on report

Assessment Data Summary Report Options

Report Options | General Summary | Report Preview

☒ Average subsamples

☒ Include 'Plot' experimental unit number

☒ Display extended 'Plot' experimental unit description information

Extended assessment data information

☒ Comment


☒ Barcode

☒ GPS

☒ Image

Width:

"Damaged" plot value - handled as missing data during analysis

Appl		
Code	Plot	2
ABC	103	50.0
		Animal damage to plot
		
	204	100.0
	305	100.0
	404	100.0
	Mean =	100.0

AOV Means Table Report

Print range of LSD values used to compare the largest and smallest **non-zero** means for any log, arcsine, or square root transformed data

Pest Code		SEPTTR	SEPTTR
Part Rated		LEAF3 P	LEAF2 P
Rating Date		Jun-18-2014	Jul-2-2014
Rating Type		PESSEV	PESSEV
Rating Unit		%	%
Days After First/Last Applic.		64 15	78 29
ARM Action Codes		AL	AA
Trt Treatment	Rate		
No. Name	Rate Unit	5*	7*
1 Untreated Check		6.89 a	15.14 a
2 Tub	0.5 l/ha	1.28 b	1.23 bc
3 Tub	1 l/ha	1.04 b	0.40 c
4 Tilt 250	0.5 l/ha	1.60 b	1.51 bc
5 Mico 60	1.5 l/ha	1.19 b	3.09 b
Fungol	1.25 l/ha		
LSD P=.05		1.878 - 3.785	1.218 - 4.299
CV		39.69t	23.81t

AOV Means Table Report

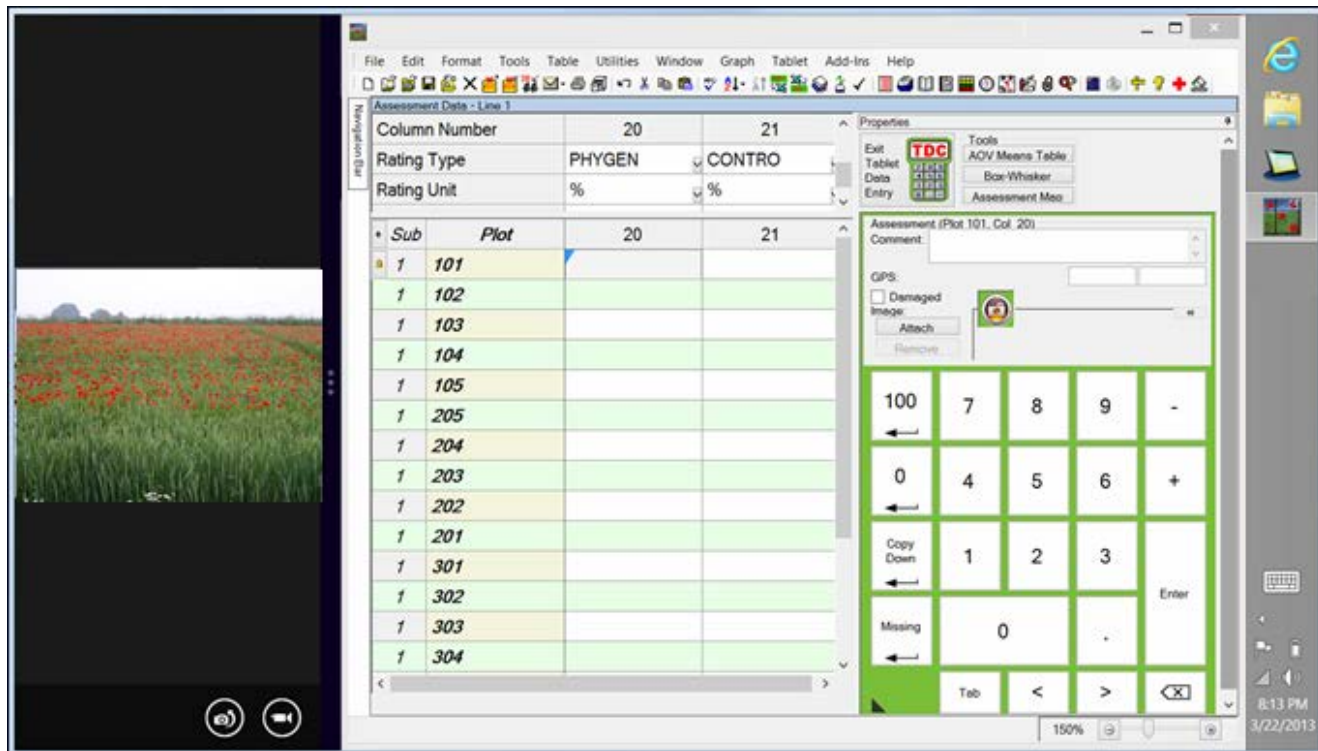
Example using this log transform:

- Compare 6.89 vs. 1.60 using $LSD \approx 3.785$
(largest mean vs. next largest)
- Compare 1.04 vs. 1.19 using $LSD \approx 1.878$
(smallest mean vs. next smallest)

Rating Type	PESSEV
Rating Unit	%
ARM Action	AL
Trt Treatm	
No. Name	
1 Untreat	6.89 a
2 Tub	1.28 b
3 Tub	1.04 b
4 Tilt 250	1.60 b
5 Mico 60 Fungol	1.19 b
LSD P=.05	1.878 - 3.785

Tablet Data Collector

Pinch-to-zoom, for easier screen resizing on Windows touch tablets



Tablet Data Collector

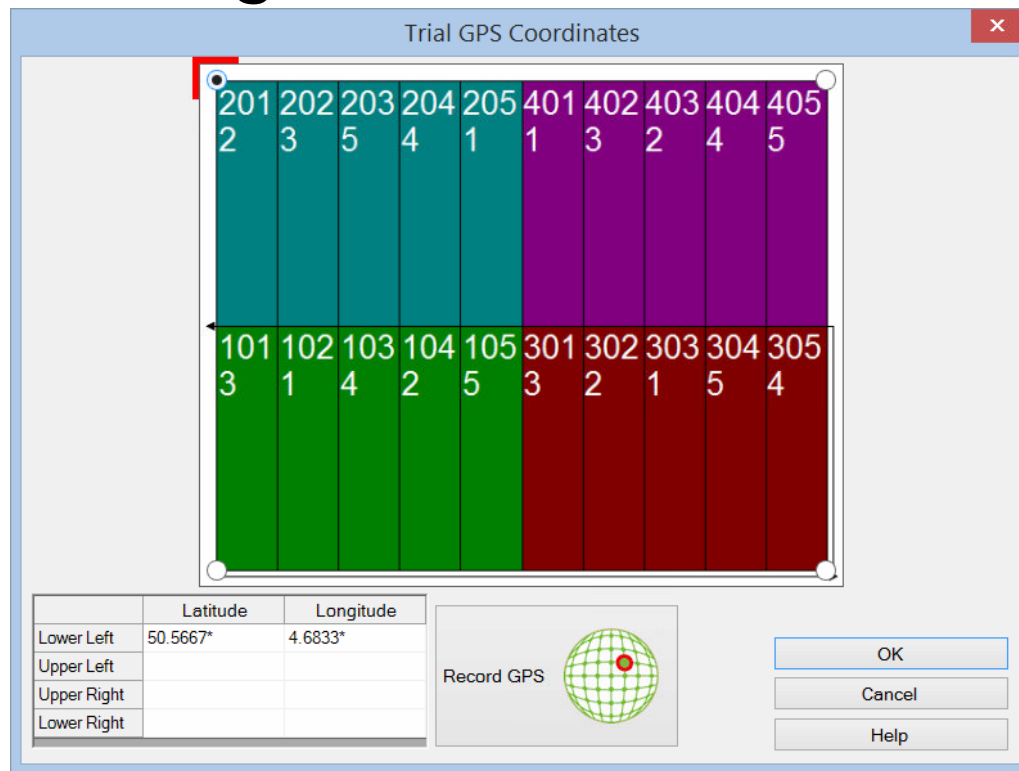
'Set GPS' button records location of:

- Current data value
- Current plot

The screenshot shows the 'Properties' window of the Tablet Data Collector (TDC) software. The interface includes a 'Tools' section with buttons for 'AOV Means Table', 'Box-Whisker', and 'Assessment Map'. The main area displays 'Assessment (Plot 101, Col 14)' and a 'Comment' field. A 'Set GPS' button, featuring a globe icon, is circled in red. Below this are checkboxes for 'Damaged' and 'Image', with 'Attach' and 'Remove' buttons. A small image of a field is visible. At the bottom, there is a numeric keypad with digits 100, 7, 8, 9, and a minus sign, along with navigation buttons like 'Tab', '<', '>', and a back arrow. The status bar at the bottom right shows a zoom level of 120%.

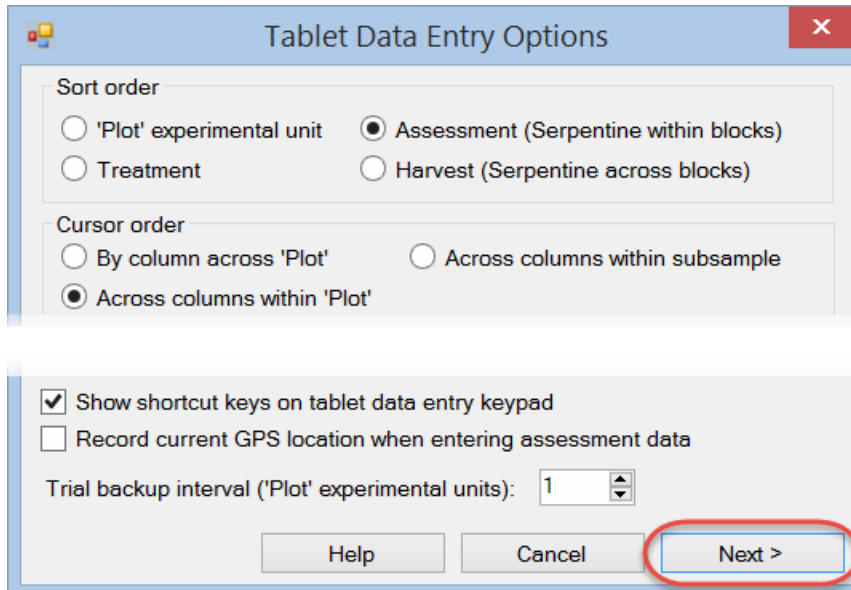
Tablet Data Collector - GPS

Displays Trial Map to show actual trial shape when recording GPS for trial corners



Tablet Data Collector 2016.1

Starting 'Tablet Data Entry' mode displays a wizard to also define 'Image Auto-Capture', reducing number of steps to take pictures



Tablet Data Entry Options

Sort order

☐ 'Plot' experimental unit ☒ Assessment (Serpentine within blocks)

☐ Treatment ☐ Harvest (Serpentine across blocks)

Cursor order

☐ By column across 'Plot' ☐ Across columns within subsample

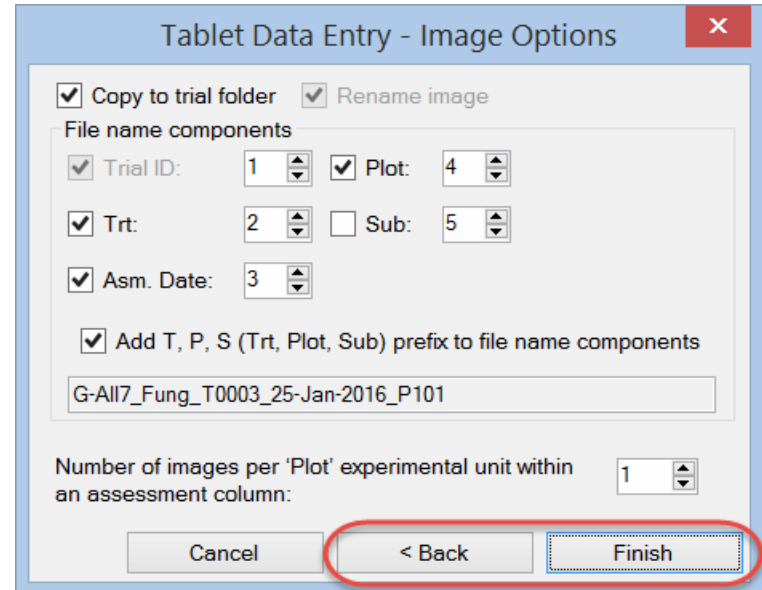
☒ Across columns within 'Plot'

☒ Show shortcut keys on tablet data entry keypad

☐ Record current GPS location when entering assessment data

Trial backup interval ('Plot' experimental units): 1

Help Cancel **Next >**



Tablet Data Entry - Image Options

☒ Copy to trial folder ☒ Rename image

File name components

☒ Trial ID: 1 ☒ Plot: 4

☒ Trt: 2 ☐ Sub: 5

☒ Asm. Date: 3

☒ Add T, P, S (Trt, Plot, Sub) prefix to file name components

G-AI17_Fung_T0003_25-Jan-2016_P101

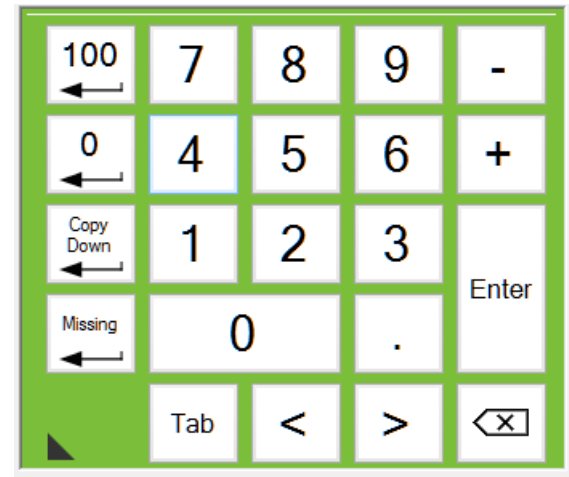
Number of images per 'Plot' experimental unit within an assessment column: 1

Cancel **< Back** **Finish**

Tablet Data Collector 2016.1

Further touch interface improvements:

- Study List fits on 7" tablet
- Touchpad:
 - Text auto-sizes for button size
 - Tab and arrow keys are larger
- Larger 'display list' buttons are easier with fingers
- Auto-closes Study Rules tab



Column Number	14
Part Rated	<input type="checkbox"/>
Rating Date	
Rating Type	
Rating Unit	



New Tablet Hardware

- HarvestMaster Mesa 2
 - 7 inch Windows 8.1/10 tablet
 - Waterproof, dustproof
 - Planned for release in 2Q2106
- Motion Computing CL920
 - 10 inch Windows 8.1 tablet
 - Rain resistant, dustproof
 - Available 1Q2016



Study List

- Guidelines in study list are now listed separately in dropdown selection list, to more easily find suitable trials
- More indexed fields:
 - Trial Address
 - GEP Accreditation Link
 - Interval to Prev. Appl.
 - Crop Stage Majority
 - Artificial Population

The screenshot shows a software interface with a 'Selected Study' dropdown at the top. Below it is a 'Filter' section with a tree view containing 'Header', 'Treatment', 'Site Description', and 'Site Description - Gene'. To the right of the filter is a form with fields for 'Latitude', 'Climate Zone', 'GLP', 'Official Trial ID', and 'Guideline'. A dropdown menu is open for the 'Guideline' field, showing a list of options: '(All)', 'CEB 189', 'PP 1/135(2)', 'PP 1/135(3)', 'PP 1/152(2)', 'PP 1/152(3)', 'PP 1/181(3)', 'PP 1/26(3)', 'PP 1/49(2)', and 'PP 1/49(3)'. A red box highlights this dropdown menu. Below the filter section is a table with columns 'Selected' and 'Study ID'. The table contains several rows, including 'G-AII7_F', 'Fung Do', 'G-AII_Sp', 'G-AII_Sp', 'G-AII_Sp', 'G-AII7_F', 'G-AII7_H', and 'NEPDSO16'. A red arrow points from the 'GEP Accreditation Link' field in the bottom right to the 'G-AII7_F' row in the table.

General Trial

GEP Accreditation Link: <http://gepcertibase.eu/certificate/download/1d52df9da53>

Study List

- Previous Filters list shows recent queries for locating studies of interest, to easily find and re-use past searches

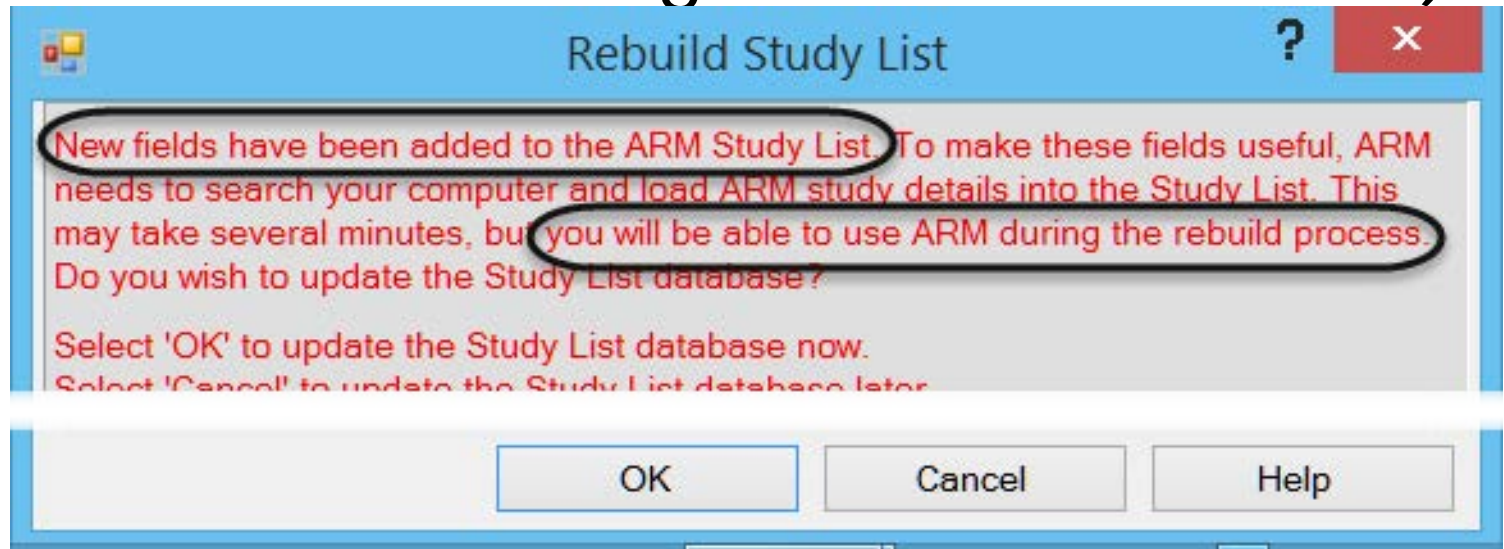
The screenshot displays the 'Study List' application window. On the left, a list of studies is shown with checkboxes and columns for study names, dates, and categories. Below this list are buttons for 'Select All', 'Clear All', and 'Remove Filter', along with checkboxes for 'Include archived studies' and 'Tutorial'. A 'Previous Filters' dialog box is open on the right, showing a table of recent search filters.

	Last Used	Study List Filter
1	Jan-5-2016	Study Type is 'Trial', Exclude Latitude is (Blank)
2	Jan-4-2016	Study Type is 'Trial'
3	Jan-4-2016	Study Type is 'Protocol', Treatment Name is 'Accord'
4	Jan-4-2016	Study Type is 'Trial', Treatment Name is 'Accord'
5	Jan-4-2016	Study Type is 'Trial', Study ID is 'G-AII7_Fung'
6	Dec-2-2015	Study Type is 'Trial'
7	Dec-2-2015	Study ID contains 'herb'
8	Dec-1-2015	File Name contains 'renea'

Buttons: OK, Cancel

Study List

- Asks to rebuild study list after installing an ARM update with new indexed fields
- Can continue using ARM during rebuild (which runs in a background ARM session)



Trial Map

Change plot number format at any time without re-randomizing the trial:

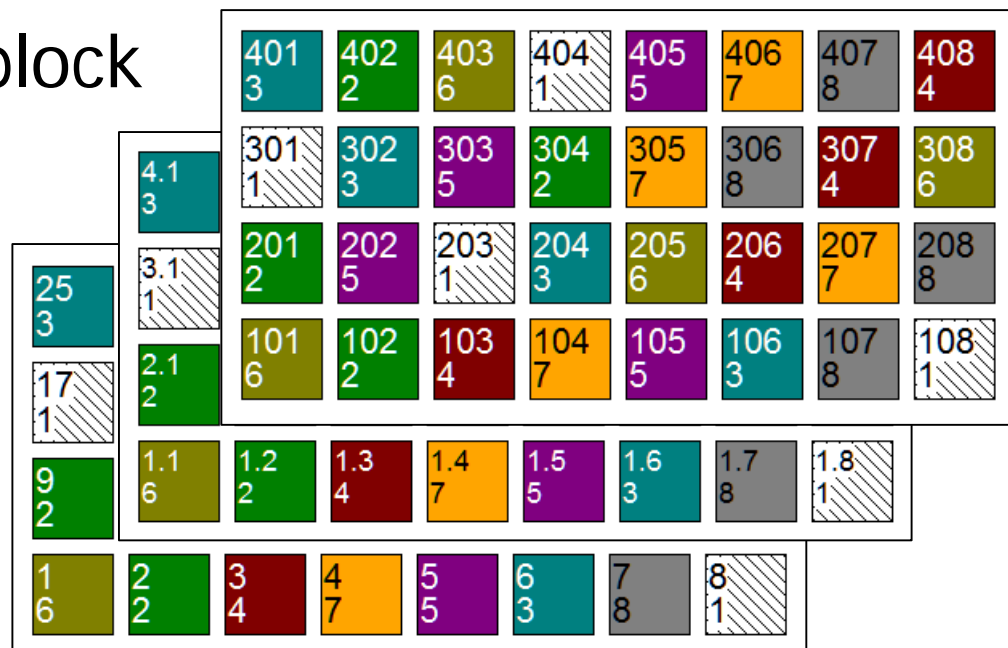
- Standard by rep/block
- Range by Row
- Sequential

Trial Settings

Layout

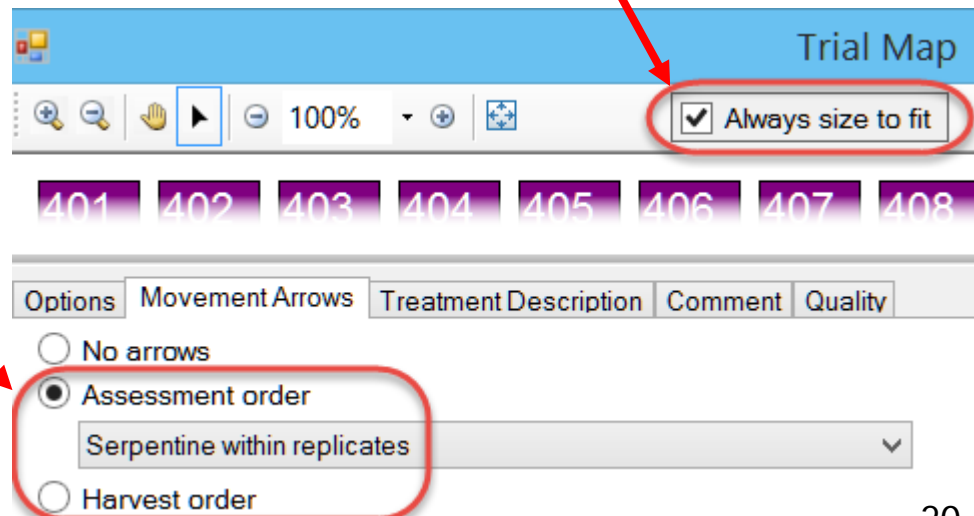
'Plot' numbering: Standard by rep (101,102, etc.) ▼

- Standard by rep (101,102, etc.)
- Standard by block (101,102, etc.)
- Range by Row
- Sequential (1, 2, 3, etc.)



Trial Map

- Dynamically auto-resize map and zoom level so entire trial always fits into trial map dialog
- New movement arrow choices:
 - Serpentine within replicates
 - Reversed serpentine within replicates
 - Within replicates
 - Reversed within replicates



GDM and HarvestMaster

ARM Connect to
HarvestMaster
Mirus Software:



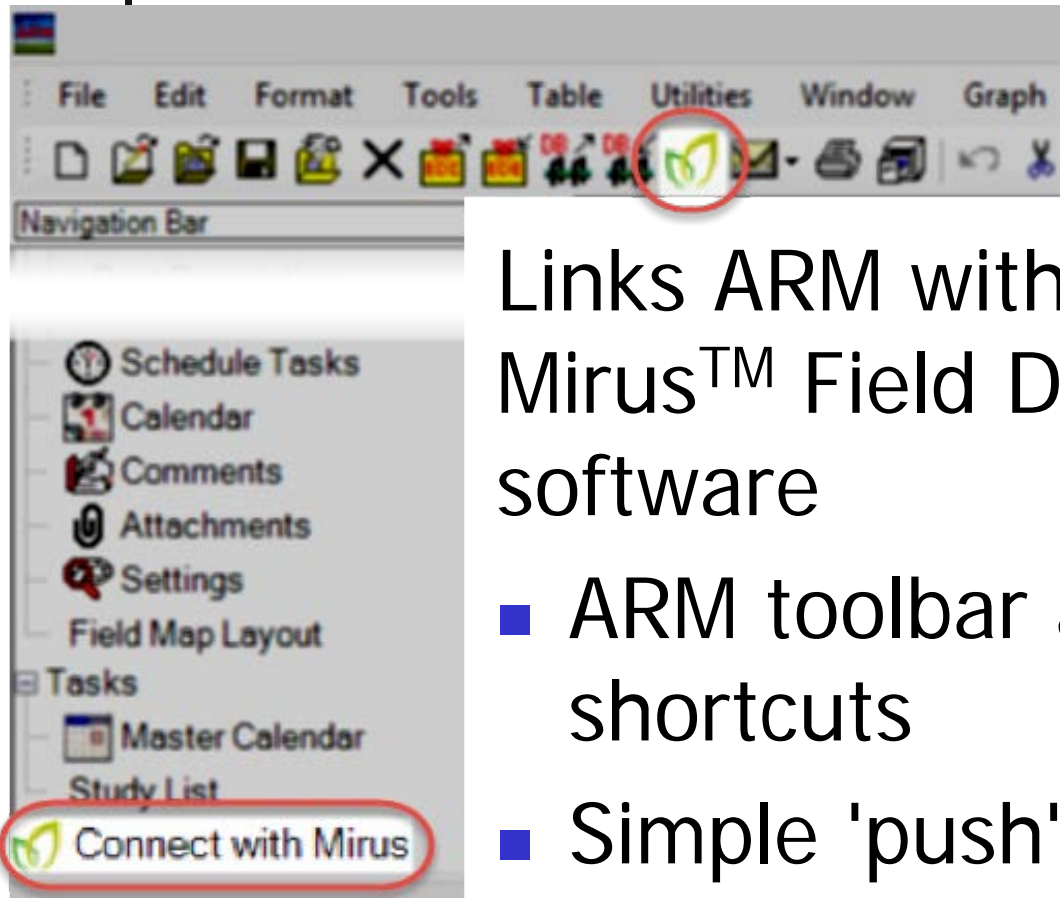
HarvestMaster.

- ARM pushes field or trial map to Mirus
- Mirus uses with:
 - HarvestMaster Harvest Data Systems
 - Research sprayers
 - Other research equipment
- Mirus pushes harvest results to ARM

Details at GDM and HarvestMaster booths in exhibit hall



Connect with Mirus 2016.1

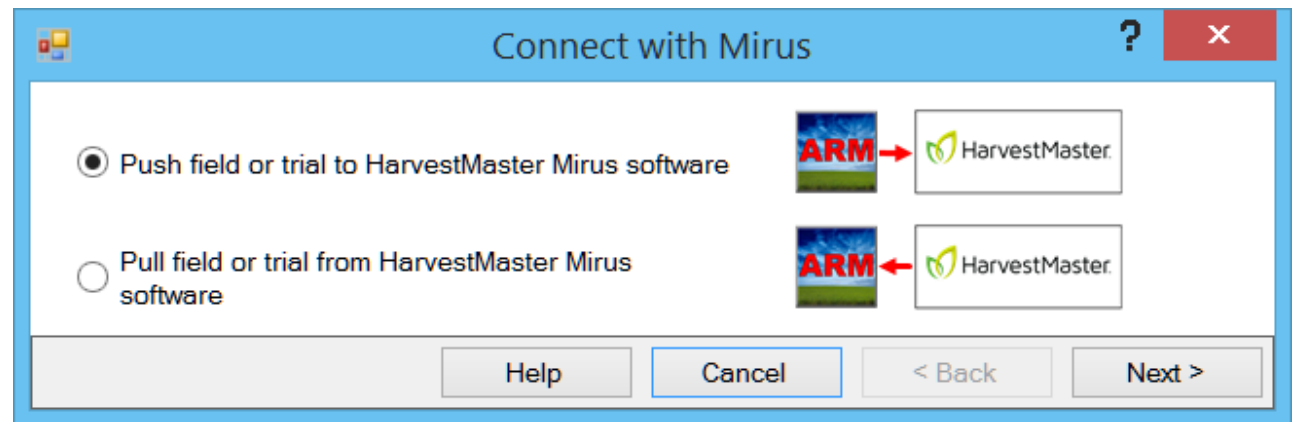


Links ARM with HarvestMaster's Mirus™ Field Data Collection software

- ARM toolbar and Navigation Bar shortcuts
- Simple 'push' and 'pull' connector

Connect with Mirus 2016.1

- Wizard interface for simplicity



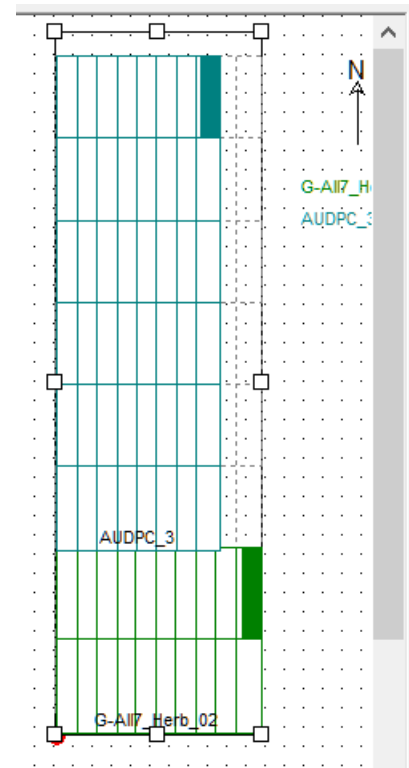
- Choose field or trial(s) from Study List

Study List			
Select trial(s) to push to HarvestMaster Mirus software.			
Field Map	Location	Crop Code	Study ID
	Shipman, IL 62012	TRZAW	AUDPC_2
	Brighton, IL 62012	TRZAW	AUDPC_3

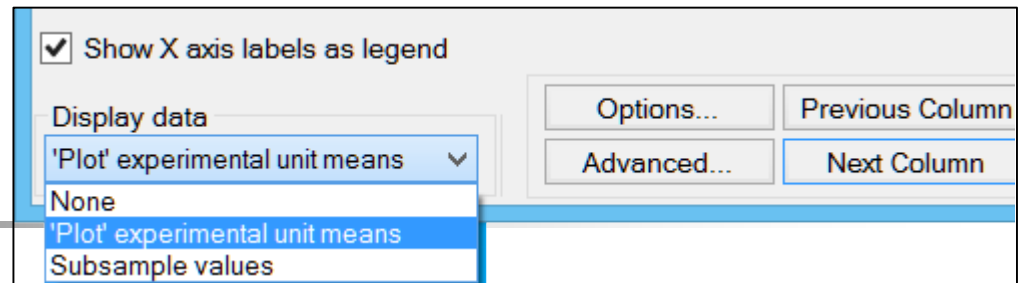
Connect with Mirus 2016.1

Major improvements to ARM field map to support layout and harvest of multi-trial fields, such as:

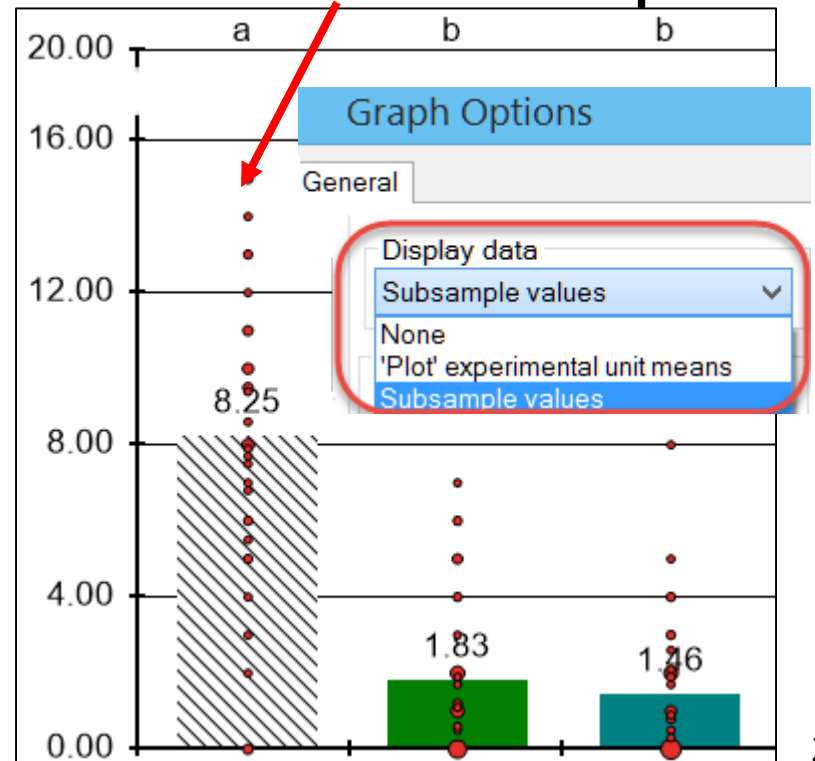
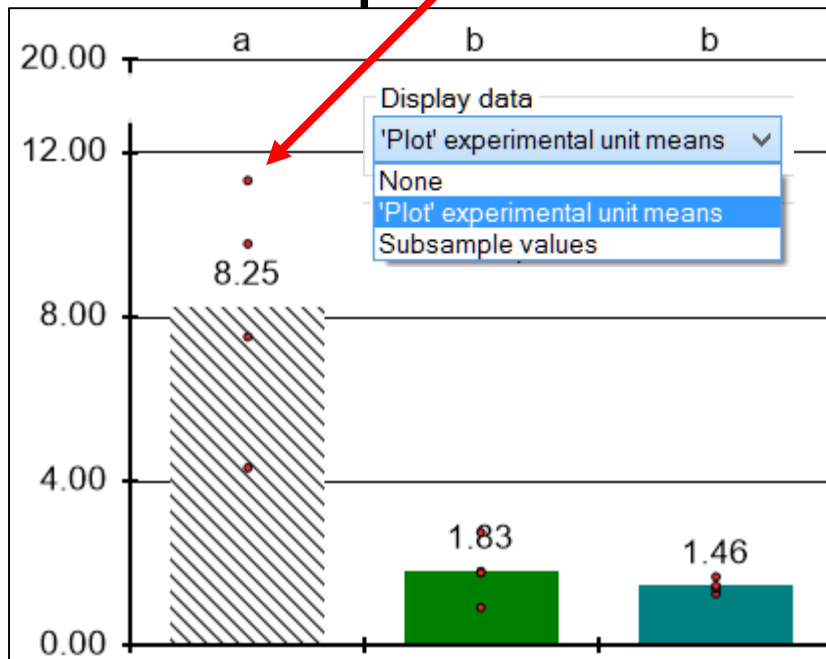
- Plot grid for trial layout
- Drag to arrange trials
- Use GPS trial coordinates



Graphs

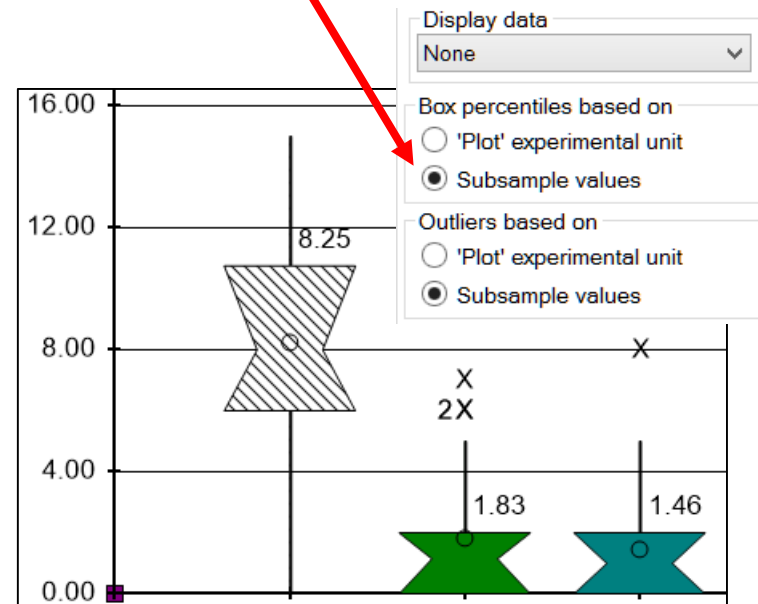
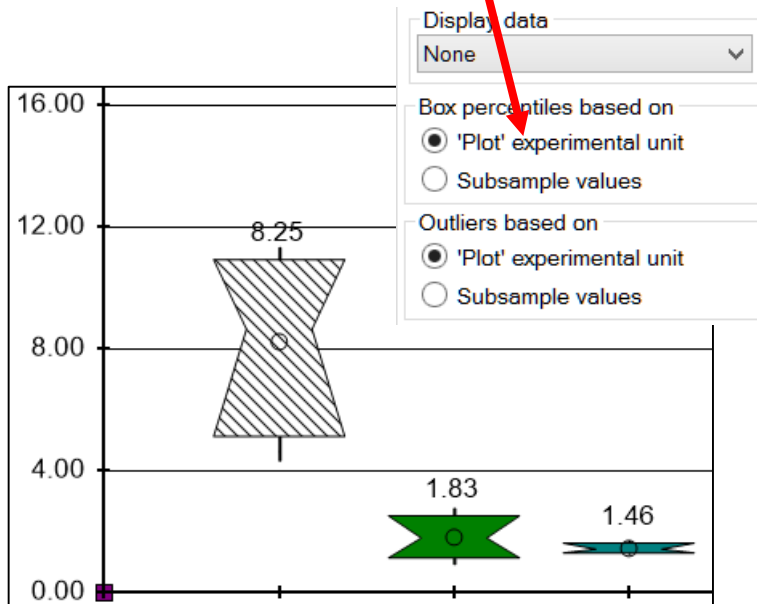


'Display data' option on viewer adds scatter graph showing plot or individual subsample values as points



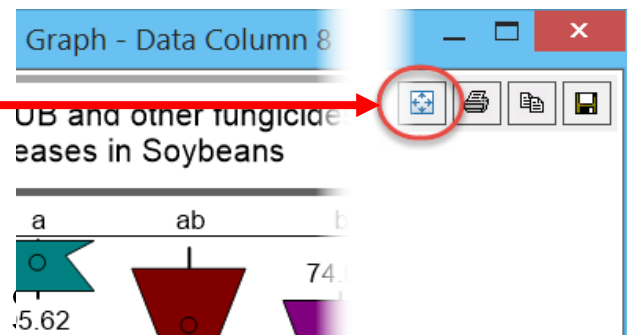
Box-Whisker Graph

'Box percentiles' and 'Outliers based on' options of 'Plot' or 'Subsamples' for box-whisker

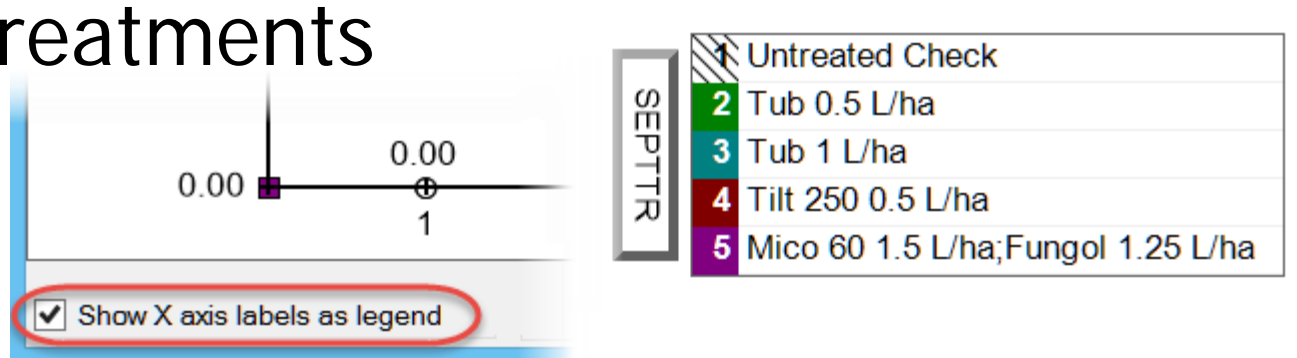


Graphs

- New 'Size to Fit' button re-sizes and re-positions graph to fit current window

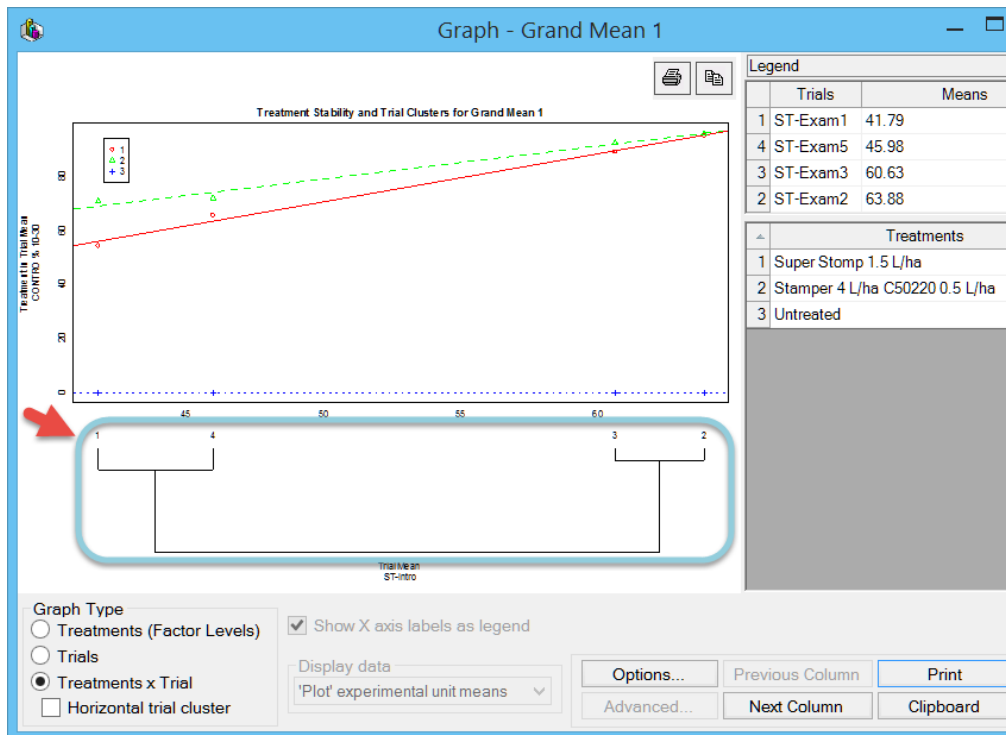


- Use 'Show X axis labels as legend' to better display detailed treatment information or many treatments

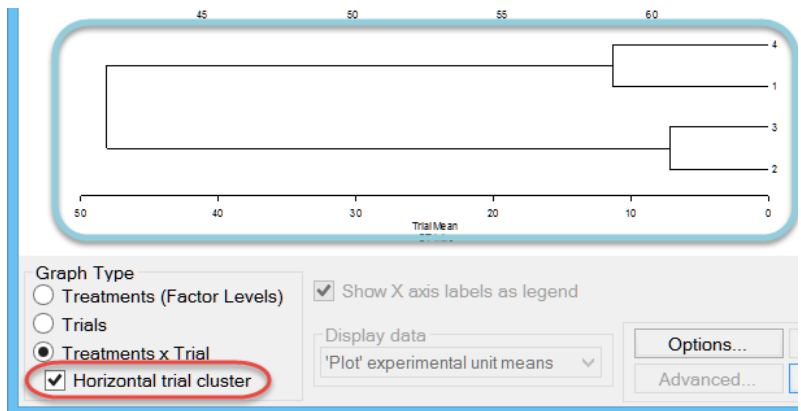


ST Graph

'Horizontal Trial Cluster' option shortcut on graph viewer for a Treatment x Trial graph



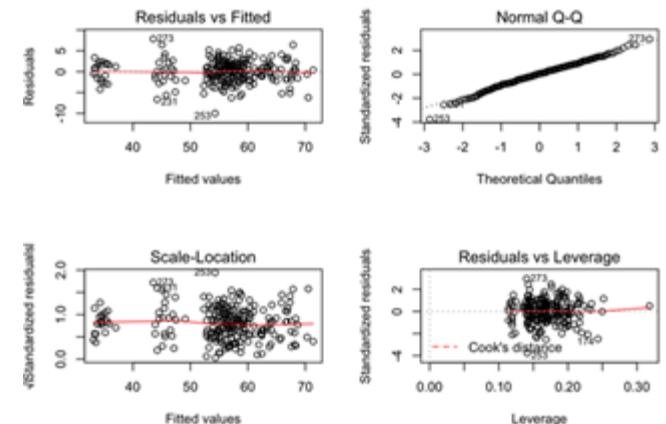
- Better displays large number of trials
- Includes its own X-axis



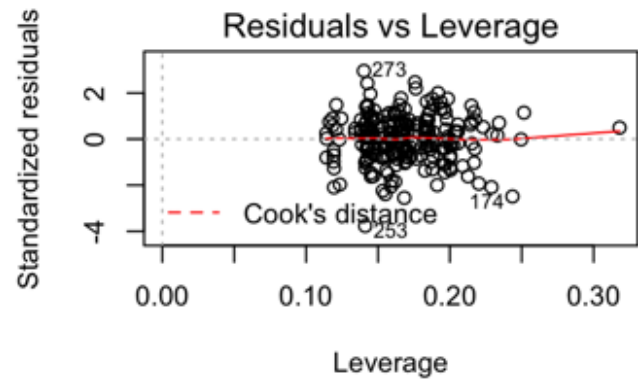
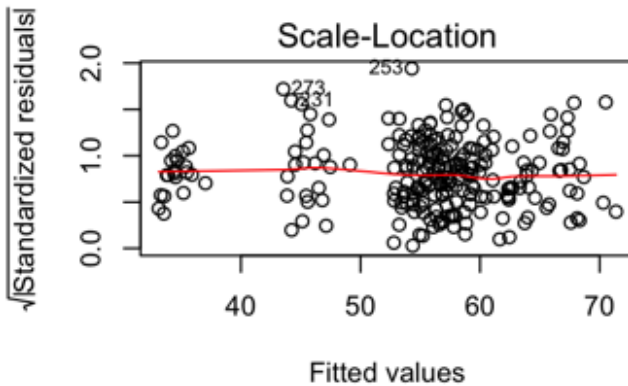
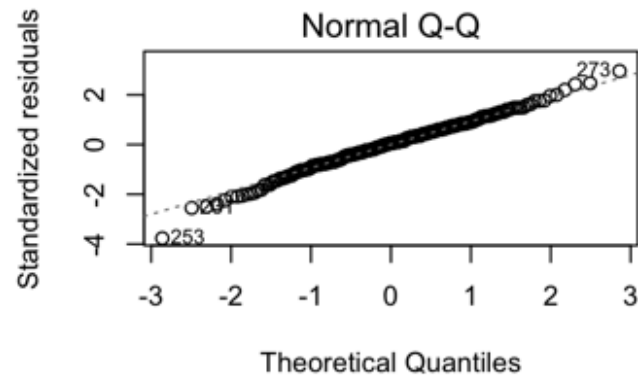
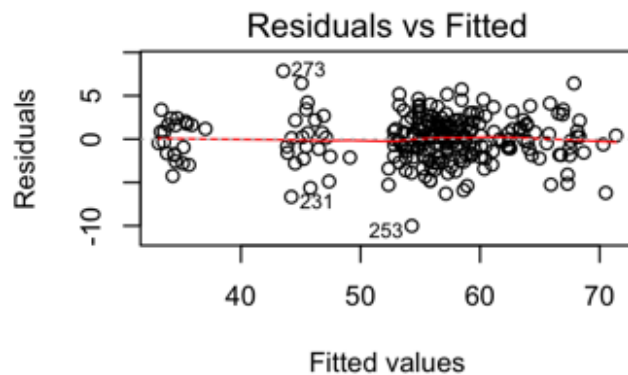
Residuals Graphs (Coming soon)

- On assessment editor
- Shows **unexplained** variability after removing treatment and replicate effects from analysis
- Can indicate when using a data correction transformation may help meet AOV assumptions

Column 1 Properties	
Previous	Next
Column Flags:	Original
Min/Max entry:	0 100
Low/High value:	0 0
Descriptive Statistics	Refresh
LSD P=.05:	0.00
Standard Deviation:	0.00
CV:	0.00
Grand Mean:	0.0
P(Bartlett's X2):	.
P(Friedman's X2):	1.0
Skewness:	.
Kurtosis:	.
Replicate Prob(F):	1.0000
Treatment Prob(F):	1.0000



Residuals Graphs (Coming soon)





ARM 2016

- Released December 31, 2015
- Automatically provided to clients using ARM 2015, via electronic download by ARM Check for Updates program