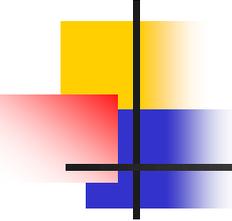


# ARM 2017 and ARM 2016 Changes

---

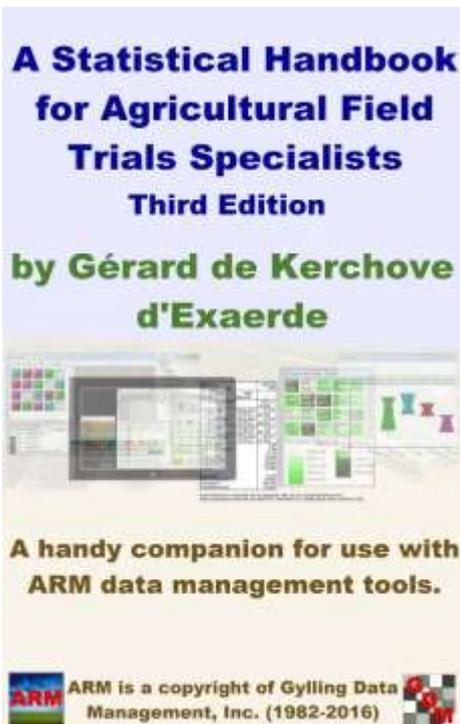


NAICC 18<sup>th</sup> Tips & Techniques  
Gylling Data Management, Inc.



# Statistical Handbook 3<sup>rd</sup> Edition

---



## **A Statistical Handbook for Agricultural Field Trials Specialists: A handy companion for use with ARM data management tools**

Available as an eBook from:

- Amazon: <https://www.amazon.com/Statistical-Handbook-Agricultural-Trials-Specialists-ebook/dp/B01KIHJRWQ/> also offered in Print
- Kobo: <https://store.kobobooks.com/en-us/ebook/a-statistical-handbook-for-agricultural-field-trials-specialists>

# Create Trial

- Displays planned trials grid in protocol
- Click in grid row to select trial(s) to create
- Creates each trial using listed Trial ID, opens in separate ARM sessions
- Option to keep protocol open when finished



ARM Request

Select a 'Trial ID' to use for creating a trial

Protocol Description

Trial Establishment Guidelines

Trial ID	Responsible	Number of Trials	Site Requirements
G-AI7_Ins1-3	SPAIN	3	
G-AI7_Ins4-5	ITALY	2	

Keep protocol open after creating trial, because I plan to create several trials.

OK Cancel

# 'Create this Trial' in Protocol

- Right-click on row of trial to create in planned trials grid of protocol
- Creates each trial using listed trial ID, opens in separate ARM sessions

The screenshot shows a software window titled 'Protocol Description'. It has several tabs: 'Trial Establishment Guidelines', 'Crop/Pest Description', 'Soil', 'Application', and 'Crop St...'. The 'Trial Establishment Guidelines' tab is active, displaying a table with the following data:

Trial ID	Responsible	Number of Trials	Sit
G-All7_Ins1-3	SPAIN	3	
G-All7_Ins4-5	ITALY	2	

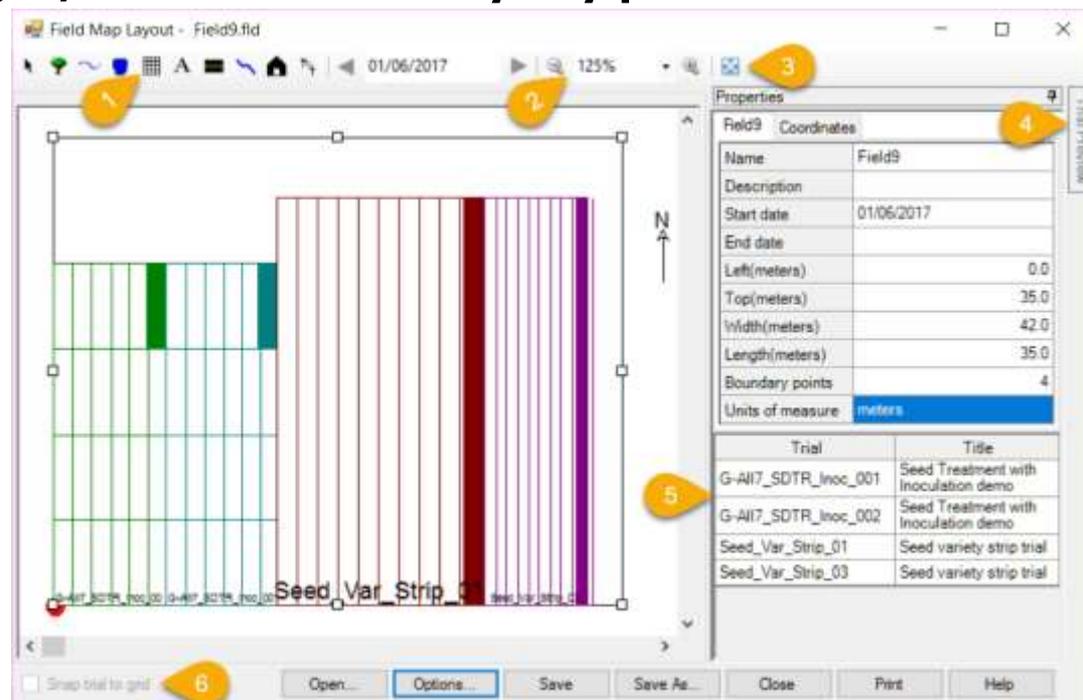
Below the table, there are input fields for 'Total Trials: 5' and 'Trial Cost:'. There are also dropdown menus for 'Conduct Under GLP: N' and 'Conduct Under GEP: N', and a checkbox for 'Officially Recognized'. At the bottom, there is a table with the following data:

No.	Guideline	
1.	PP 1/135(3)	Phytotoxicity assessment
2.	PP 1/152(3)	Design and analysis of effi

At the bottom left, there is a label 'Objectives:'. A context menu is open over the table, with the 'Create this Trial' option highlighted. The menu items include: 'Insert Repeating Section...', 'Delete Repeating Section...', 'Save Repeating Section It...', 'Load Repeating Section S...', 'Hide Current Field', 'Display All Fields', 'Display Hidden Fields with', 'Set As Default', 'Protocol Description View', 'Tile Protocol Description a', 'Show Validation List...', 'Accept All Changes', 'Create this Trial', and 'Show Tooltip'.

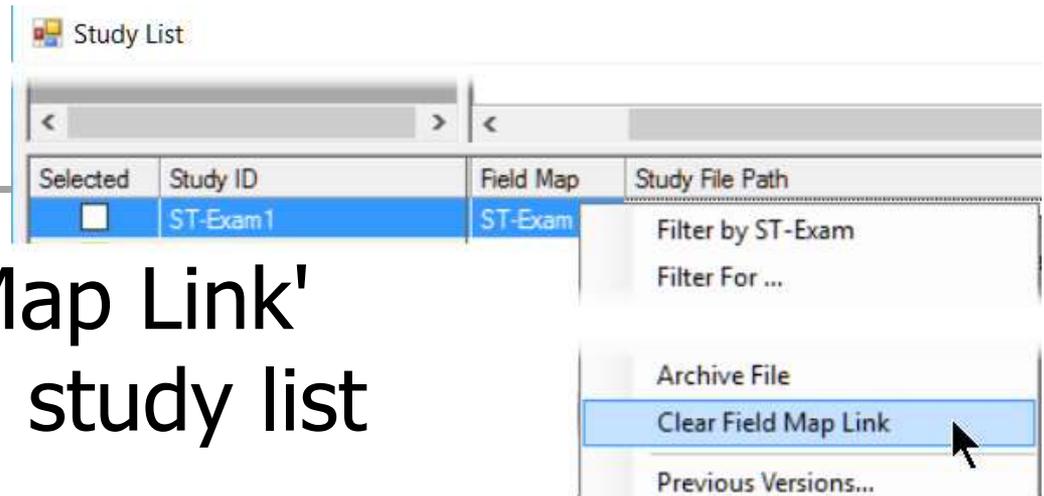
# Field Map

1. Add trials from study list
2. Larger zoom range, or manually type a value
3. Size-to-Fit button
4. Trial Preview tab
5. Trial legend grid
6. Snap trial to grid

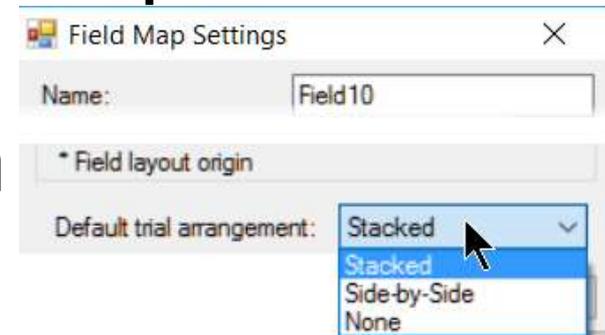


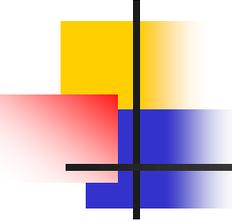
# Field Map

- 'Clear Field Map Link' right-click on study list



- 'Default trial arrangement' option on Field Map Settings, to auto-arrange trials when added to field map





# Augmented Designs

---

- Augmented Randomized Complete Block
- Augmented Completely Random Design
- On Design tab of Settings dialog
- Typically used when:
  - Experimental material for test treatments is scarce so not possible to replicate in the design
  - Enough control material to replicate

# Augmented Designs

Protocol Settings

General Design Treatment Application Layout

Augmented Randomized Complete Block (ARCB) ▾

Factors: 1 ▾

Treatments

A: Variety ▾ 39 ▾ Do not merge ▾

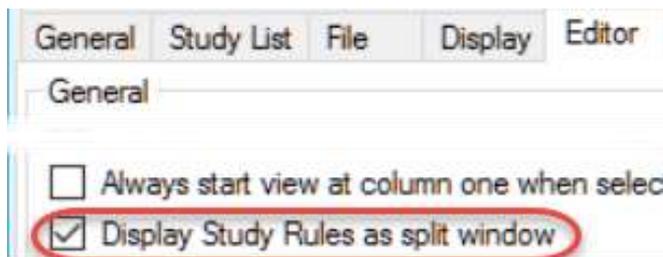
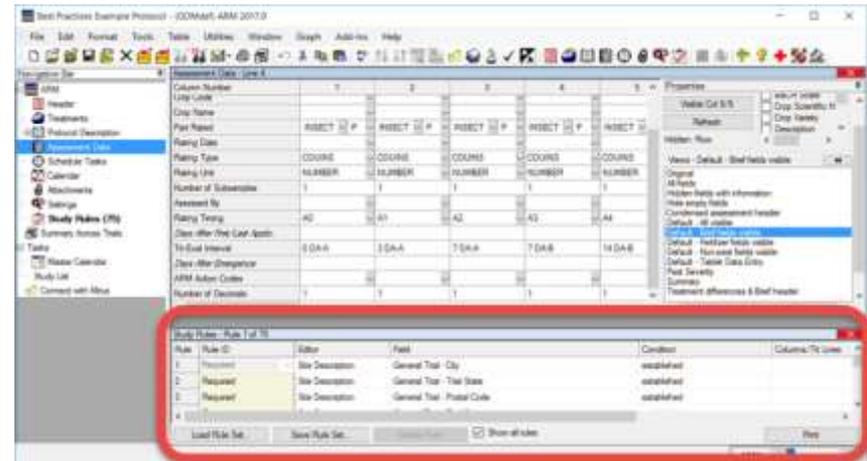
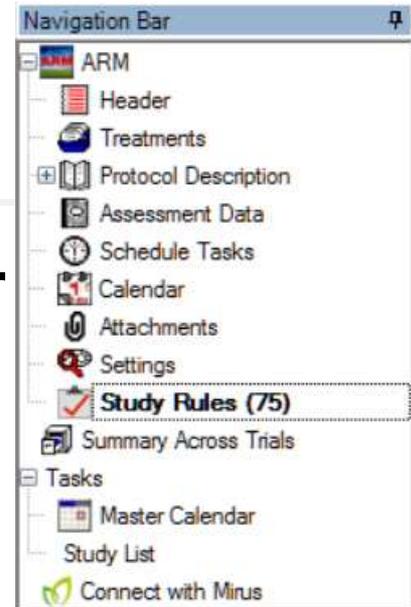
Extended design settings

Unreplicated treatments:	36 ▾	Checks	
% Checks:	25 ▾	Treatments:	3 ▾
Ratio to check 'Plots':	3	Repeats (Reps):	4 ▾
Minimum number of 'Plots':	48	'Plots':	12

Tip: Select 'Automatic to approximate square replicate' on the Layout tab to have ARM generate a better quality randomization.

# Study Rules

- Displays as separate study editor
- When a study contains rules:
  - Rule count lists on Navigation Bar
  - Rules panel opens as lower split window
  - New Editor option to hide



# Study Rules

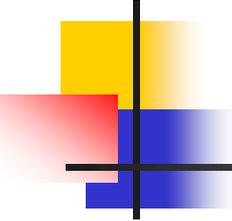
- Selectively hide protocol or site description fields according to person who opens study (based on ARM license information):
  - From everyone else
  - From everyone who is not in my company

Condition

If not in my company

If not me

If not in my company



# Study Rules

---

- Lock protocol or site description fields (such as Trial ID), to prevent modifying information in those fields by:
  - Everyone else
  - Everyone who is not in my company
- Display "All" for an assessment rule that applies to all data columns

Rule ID	Editor	Field	Condition	Columns/Trt Lines	Permissions
Strict Validation	Assessment Data	Rating Type	Always	All	All protocol owners
Strict Validation	Assessment Data	Rating Unit	Always	All	All protocol owners

# Study Rules

'Lock Treatment line to prevent edits' will prevent changing an individual Treatment field or line: use to ***protect key treatment information***

Trt Line	Trt No.	Type	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit
1	1	CHK	Untreated					
2	2	FUNG	Cyprodinil	750	G/KG	WG	0.20	kg/10000 m2 LWA
3	3	FUNG	Cyprodinil	750	G/KG	WG	0.30	kg/10000 m2 LWA

Required	Lock Field to prevent edits
Recommended	Lock Treatment lines to prevent edits
Hidden Field	Lock Treatment to prevent edits
Strict Validation	
Load Rule Set...	

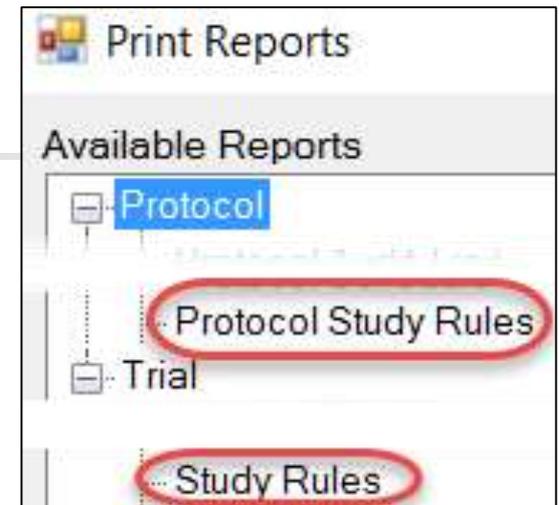
# Study Rules

- Examples of newer study rules:

Rule	Rule ID	Editor	Field	Condition
1	Required	Header	Trial Number	Lock field to prevent edits
2	Limit validation list	Assessment Data Header	Crop & Pest in Site Description	Always
3	Lock Trial ID as position 1	Assessment Data	Image Attachments	Always
4	Strict Validation	Treatments		
5	Required	Trial	Image Attachments	One or more Plots
6	Hidden Field	Protocol Description	Trial Establishment Guidelines - Responsible	If not in my company

# Study Rules

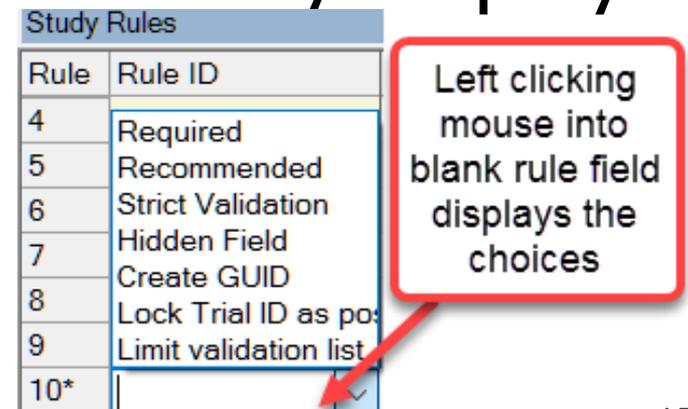
- New Protocol and Trial 'Study Rules' reports on the Print Reports dialog

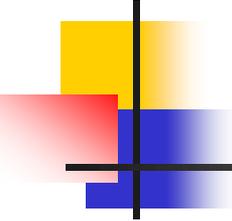


Study Rules					
Rule	Rule ID	Editor	Field	Condition	Permissions
1	Required	Treatments	Rate	Lock Treatment line to prevent edits	All protocol owners
2	Required	Treatments	Rate Unit	Lock Treatment line to prevent edits	All protocol owners
3	Required	Treatments	Treatment Name	Lock Treatment line to prevent edits	All protocol owners
4	Required	Treatments	Form Conc	Lock Treatment line to prevent edits	All protocol owners
5	Required	Treatments	Form Unit	Lock Treatment line to prevent edits	All protocol owners
6	Required	Treatments	Form Type	Lock Treatment line to prevent edits	All protocol owners

# Study Rules

- Asks if Study Rules should be copied to the new protocol after changing the protocol ID field (a method often used to create a similar protocol)
- Drop-down fields automatically display the choice list when clicked with mouse





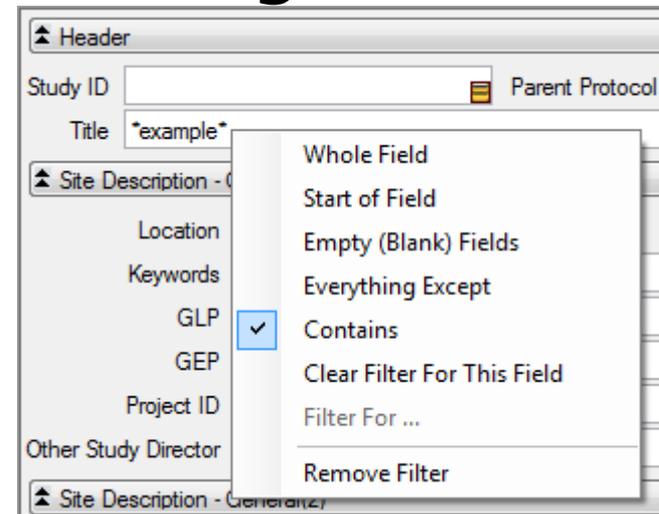
# Study Rules

---

- Entire trial revalidates after adding new study rules to a validated trial, and also that study rules are entered correctly
- Messages for invalid study rules better identify which information to correct
- 'Delete Rule' button removes a marked block
- More right-click menus to add rules

# Study List Filter Form

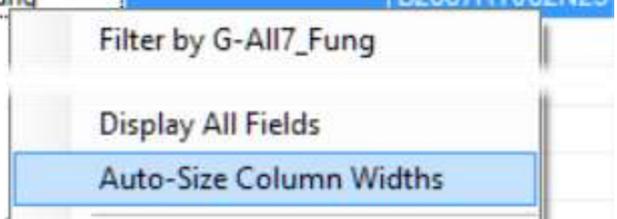
- Clicking into a field on filter form automatically scrolls lower grid to the matching column
- Right-click menu
- Automatically save Study List filters the client has applied



# Study List Grid

- 'Auto-Size Column Widths' right-click menu item sizes grid columns based on contents

Selected	Study ID	Parent Protocol	Project ID	Official Trial ID
<input type="checkbox"/>	G-AI17_Fung	G-AI17_Fung		B2007RTJ02N25



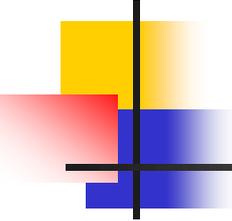
- Filter by G-AI17\_Fung
- Display All Fields
- Auto-Size Column Widths

# 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 ID, date, and status. Below the 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.

Previous 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-All7_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'



# New Study List Fields

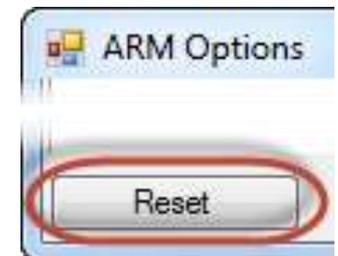
---

- Treatment Type (TTT)
- Treatment Form. Type (TFD)
- Treatment Growth Stage (TGI)
- Assessment Part Rated (ECP)
- Assessment Rating Type (EDT)
- Assessment Rating Unit (ERU)
- Crop Group (KF)
- Pest Type (~P)
- Pest Stage Majority (PS)
- Previous Crop (PC)
- Trial Region (~R)
- Reliability (TQ)
- Official Trial ID (OT)
- Climate Zone (VC)
- Study Design (ED)
- Trial Usage/Type (VU)
- Application Soil Moisture (SM)
- Rainfall/Irrigation Type (RT)
- Application Equipment (SZ)
- Nozzle Type (NT)
- Carrier (DC)
- Propellant (TP)

# Separate Option Reset Buttons

Separate "Reset" buttons for ARM Options and Report Options:

- Tools – Options: Reset program options to default settings without affecting your report changes



- Reset report options to default settings without changing other ARM program options



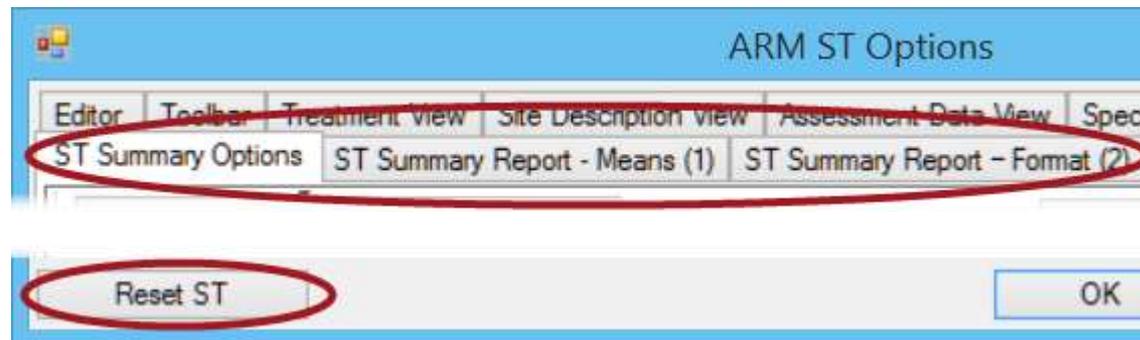
# More Option Reset Buttons

Additional "Reset" buttons to restore original default options

- Graph:

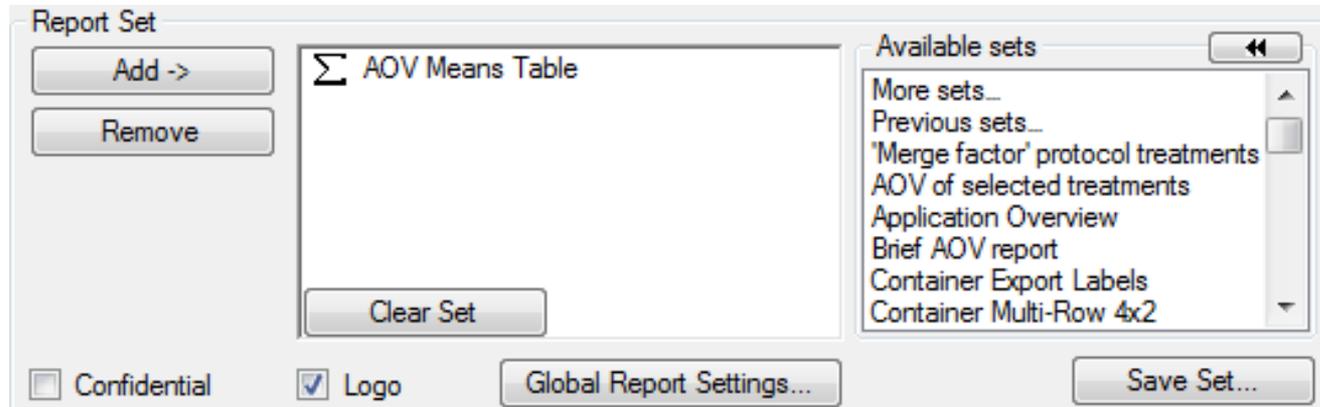


- ST:



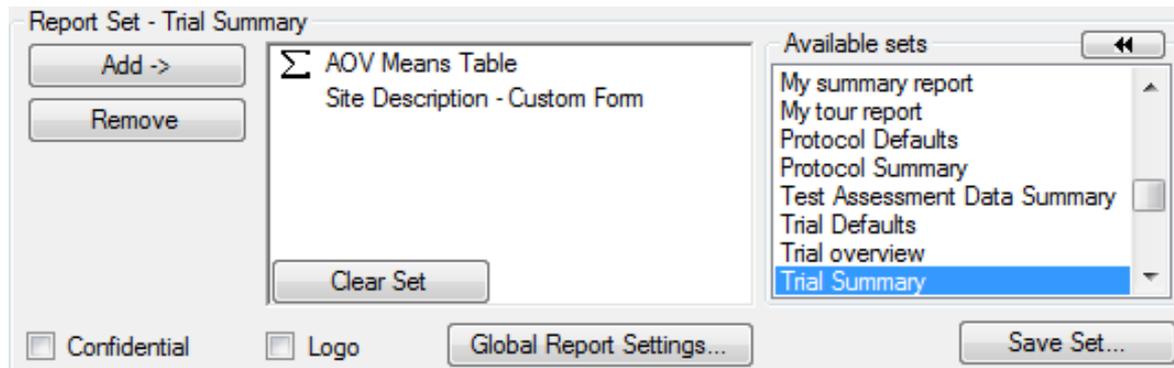
# Report Sets

- New list box displays available sets
  - Click once to select a set from list
  - "More sets" to browse
  - Shows lists across all language subfolders

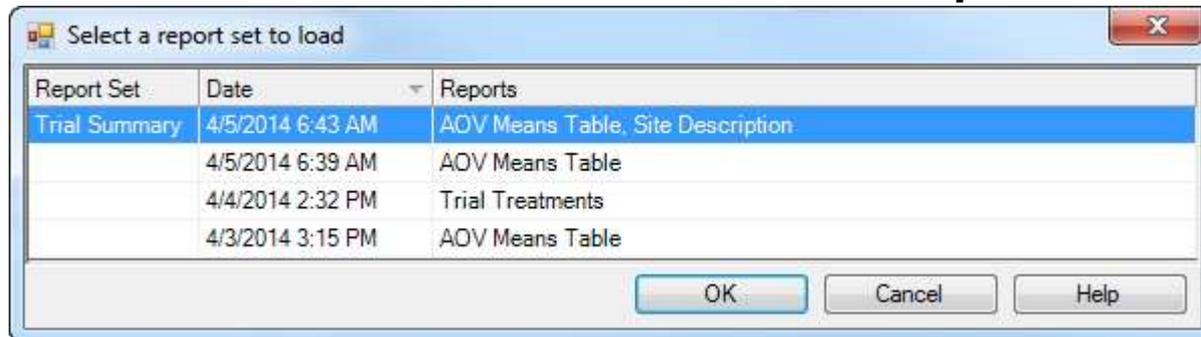


# Report Sets

- Last selected set highlighted by default



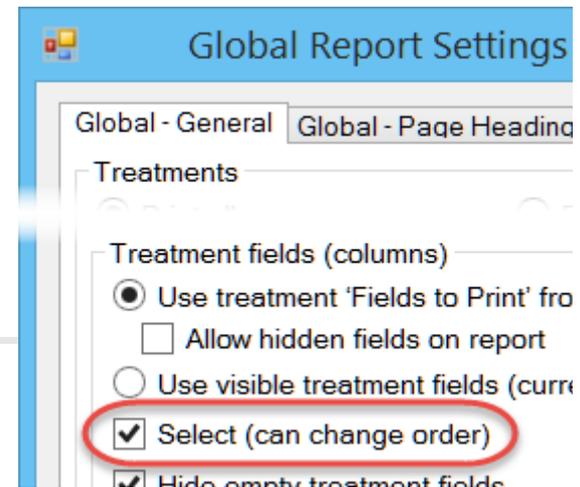
- "Previous sets" shows the report history



# Reports

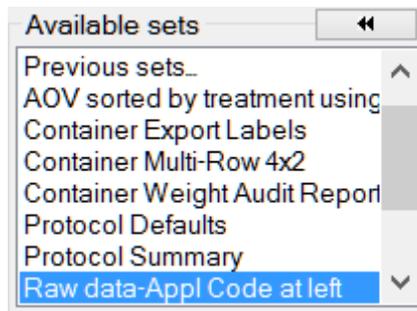
Option to:

- 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 Code	Rate Unit	Plot	
4	Tilt 250	0.5 l/ha	ABC	103		50.0

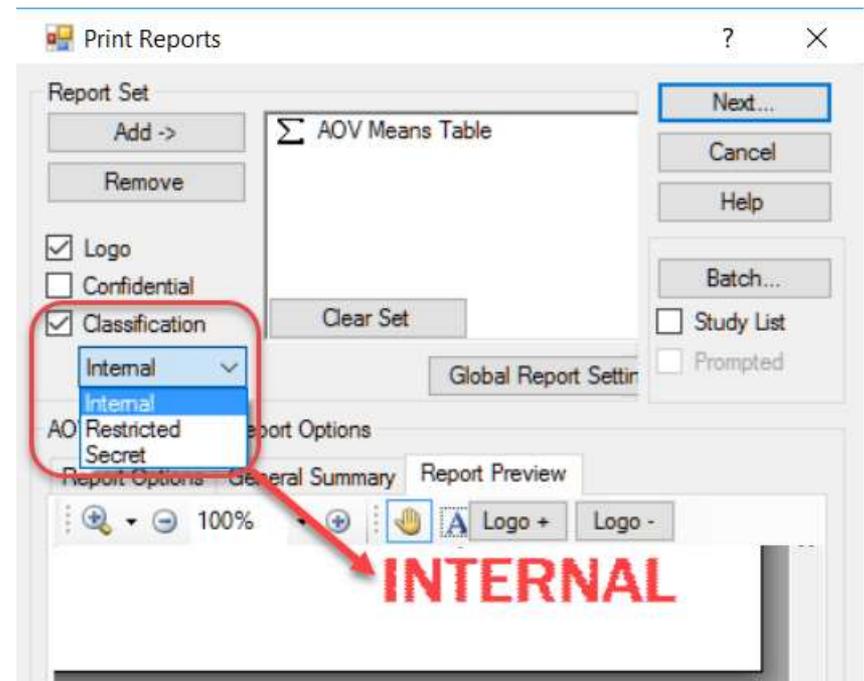
Trt No.	Appl Code	Treatment Name	Rate	Rate Unit	Plot	
4	ABC	Tilt 250	0.5 l/ha	103		50.0



# Reports

'Classification' option prints at lower-right corner of each report page, to better identify distribution scope:

- Internal
- Restricted
- Secret



# Summary Reports

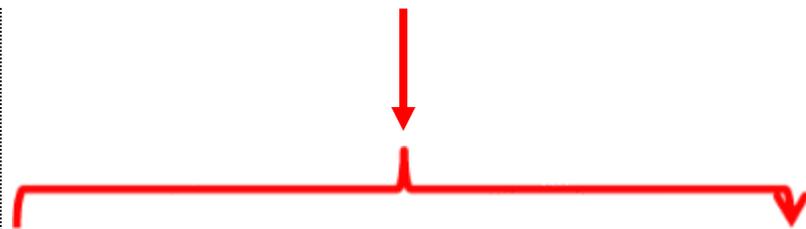
Option to merge assessment data headers over columns having the same information

**General Summary Report Options**

Fields to Print: Global - General, Global - Page Heading

Assessment data header rows

Merge data headers across columns with identical entries



					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		1	2	3	4	
No.	Code	Name	Rate	Unit	Plot				
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

# AOV Means Table Report

Prints range of LSD values used to compare the largest and smallest **non-zero** means for any log, arcsine SQR %, or square root transformed data (are **non-linear** transformations)

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 Fungal	1.5 l/ha 1.25 l/ha	1.19 b	3.09 b
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 Treatment No. Name	5*
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

# 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

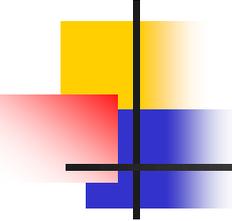
GPS

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	



# Spray/Seeding Plan Report

Prints Settings Spray Volume and Mix Size for treatments lines where not specified:

Trt Line	Trt No.	Type	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit	Appl Code	Spray Volume	Volume Unit	Mix Size	Mix Unit
2	2	FUNG	Tub	250	G/L	EC	0.5	L/ha	ABC				
3	3	FUNG	Tub	250	G/L	EC	1	L/ha	ABC				
4	4	FUNG	Tilt 250	250	G/L	EC	0.5	L/ha	ABC				
5	5	FUNG	Mico 60	600	G/L	EC	1.5	L/ha	AB	250	L/HA	2.65	Liters

Reps: 4      Appl Code: A      Plots: 2.5 by 10 meters

Trt No.	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit	Appl Code	Spray Volume	Mix Size	Amt Product to Measure	Rep 1	Rep 2	Rep 3	Rep 4
3	Tub	250	G/L	EC	1	l/ha	ABC	200 L/ha	2.15 liters	10.75 ml/mx	101	202	301	402
1	Untreated Check						ABC				102	205	303	401
4	Tilt 250	250	G/L	EC	0.5	l/ha	ABC	200 L/ha	2.15 liters	5.375 ml/mx	103	204	305	404
2	Tub	250	G/L	EC	0.5	l/ha	ABC	200 L/ha	2.15 liters	5.375 ml/mx	104	201	302	403
5	Mico 60	600	G/L	EC	1.5	l/ha	AB	250 L/HA	2.65 Liters	15.9 ml/mx	105	203	304	405

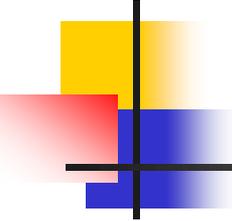
# Spray/Seeding Plan Report

Product Amount is bold font when unit is:

- Scaled differently: **ml** vs.  $\mu\text{l}$
- Has a different unit basis: /4 **pl** vs. /**mx**

Reps: 4      Appl  
 Spray vol: 200 L/ha

Trt No.	Treatment Name	Rate	Mix	Product to Measure	1	2	3	4
3	Tub	/ha	ers	1.2 ml/4 pl	10		301	402
4	Tilt 250	/ha	ers	0.6 ml/4 pl	103		305	404
2	Tub	/ha	ers	0.6 ml/4 pl	104		302	403
5	Fungol NIS	/ha 2	ers	<b>6.0 <math>\mu\text{l}</math>/4 pl</b> <b>10.75 ml/mx</b>	10	3	304	405

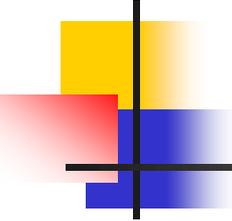


# Product Amount Totals

---

Form Unit also differentiates products in the Product Amount Totals table

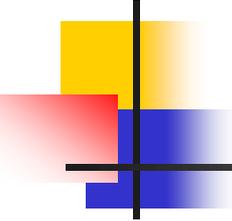
Amount*	Unit	Treatment Name	Form Conc	Form Unit	Form Type	Lot Code
2.805	ml	Banvel 720	350	gA/L	L	
4.740	ml	FallowMaster	250	gA/L	SC	
2.814	ml	Marksman	385	gA/L	F	
0.584	ml	Clarity	58	%	SC	



# Print Reports

---

- Option to:
  - Include median with treatment mean on single trial AOV report, and
  - Also include median on multi-trial ST (Summary Across Trials) AOV reports
- Median helps identify when a single value is "distorting" the mean



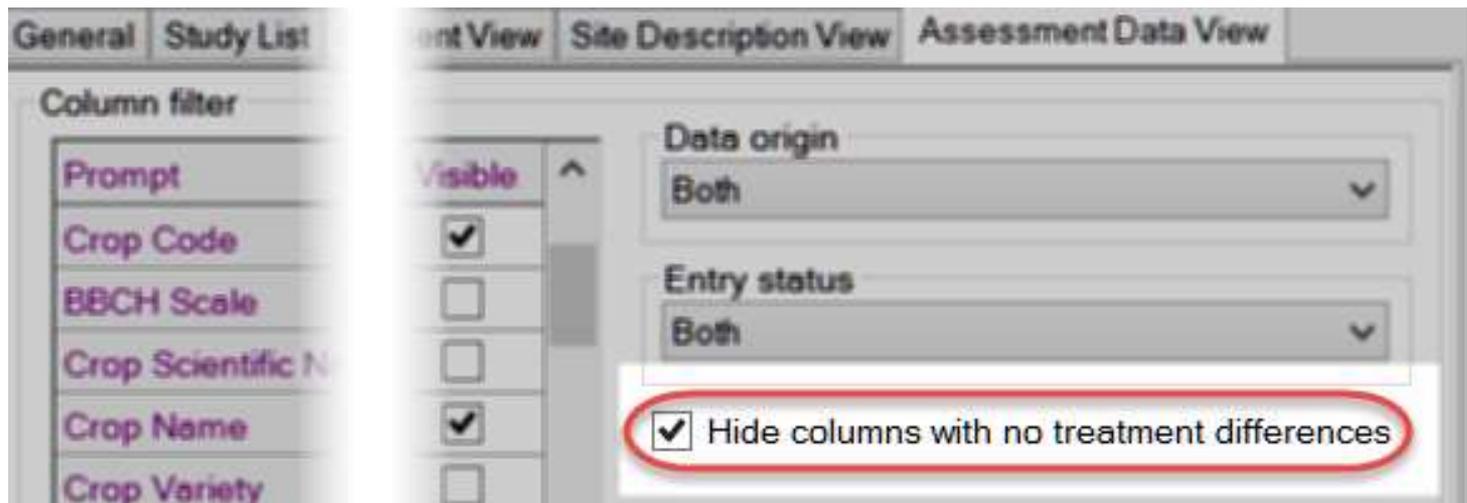
# Mean vs. Median Example

---

- Phytotoxicity data set: 0 0 0 5 20  
Mean 5  
Median 0
- % control data set: 50 90 90 90 95  
Mean 83  
Median 90
- "Balanced data set": 5 10 15 20 25  
Mean 15  
Median 15

# Assessment Data Editor

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



# Assessment Data Editor

Before:

	1	2	3	4
	LEAF	PLANT	LEAF3	LEAF3
	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
	LEAF3	LEAF3	LEAF2
	May-13-2014	Jun-18-2014	Jul-2-2014
	PESSEV	PESSEV	PESSEV
	%	%	%

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

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

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"/>

Display sort as tabs

Data origin: Original

Entry status: Data

Hide columns with no treatment differences

Ignore match

# Assessment Data Editor

SUMSUB ARM Action Code *sums* instead of *averages* subsamples when viewing 1 value per plot on editor or reports:

5 subsamples

Assessment Data - Line 8								
Column Number	2							
Part Assessed	FRUIT <input type="checkbox"/> P							
Assessment Date	05/17/2014							
Assessment Type	COUINS							
Assessment Unit	NUMBER							
Number of Subsamples	5							
Trt-Eval Interval	3 DA-A							
ARM Action Codes								
	+	Sub	Rep	Blk	Col	Plot ~	Trt	2
		1	1	1	1	101	2	108.0
		2	1	1	1	101	2	65.0
		3	1	1	1	101	2	48.0
		4	1	1	1	101	2	93.0
		5	1	1	1	101	2	76.0

First sub

	Plot ~	Trt	2
	101	2	108.0
	102	1	165.0
	103	3	70.0
	104	4	55.0
	105	5	12.0

Sum of subs

	Plot ~	Trt	2
	101	2	390.0
	102	1	165.0
	103	3	70.0
	104	4	55.0
	105	5	12.0

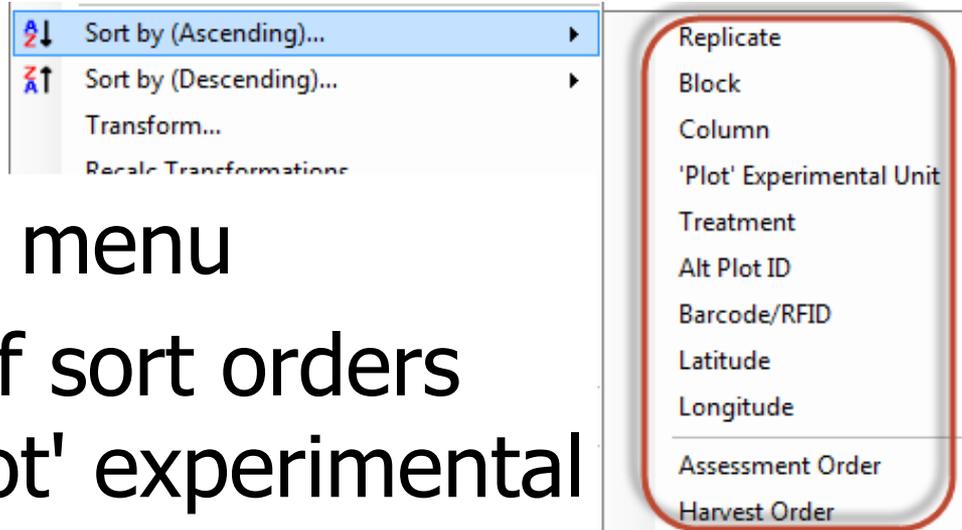
# Assessment Sorts

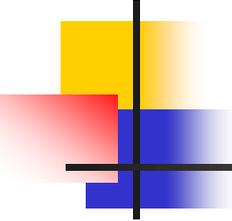
- Sort data by any 'plot' experimental unit description column
- Click heading once for ascending sort, click again for descending sort

+ Sub	Rp	Bk	Col	Plot	Tit	3
1	4	4	5	405	5	10.00
1	4	4	4	404	4	0.00
1	4	4	3	403	2	3.00
1	4	4	2	402	3	0.00
1	4	4	1	401	1	0.00
1	3	3	5	305	4	3.00
1	3	3	4	304	5	0.00
1	3	3	3	303	4	0.00

# Assessment Sorts

- New sorts are also on right-click menu
- Provides full list of sort orders from available 'Plot' experimental unit descriptors

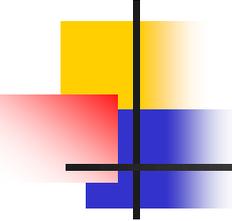




# Assessment Editor

---

- Tablet Data Entry mode: "Subsamples" data header label displays more columns
- Undo Assessment Comment, Barcode, GPS coordinate, and Damaged field changes
- Clear 'Damaged' flag from marked blocks
- Several outlier search panel fixes



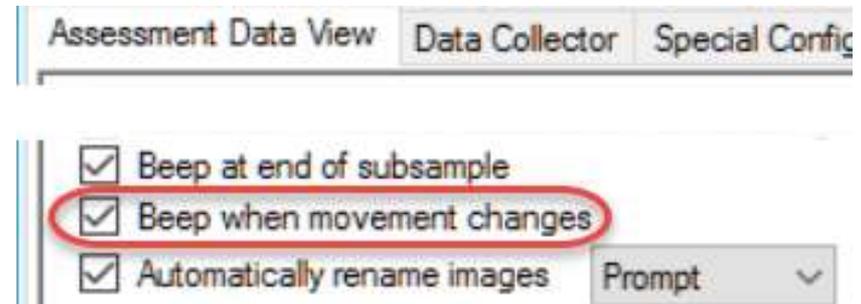
# Assessment Editor

---

- Range and Row columns are now copied when select Trial Map Plot Description copy button in range/row numbered trial
- New warning when cursor moves to top of a new column in current cursor order if a key press will overwrite existing data

# Assessment Editor

- Warning when cursor moves to top of a new column in current cursor order if a key press will overwrite existing data
- Option to beep when cursor advances to a plot that changes movement direction for Assessment or Harvest sort order



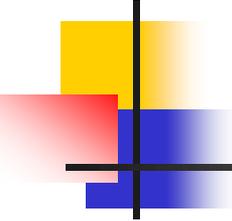
# Assessment Editor

AUDPC/SAUDPC calculates when all planned assessments are defined, yet only some contain data:

Column Number	1	2	3	4	5	6 (Calculated)
Pest Name	Powdery milde					
Assessment Date	06/08/2016	06/22/2016	07/05/2016			
Assessment Type	COUDIS	COUDIS	COUDIS	COUDIS	COUDIS	
Assessment Unit	%	%	%	%	%	AUDPC
Trit-Eval Interval	38 DA-A	52 DA-A	65 DA-A	80 DA-A	95 DA-A	

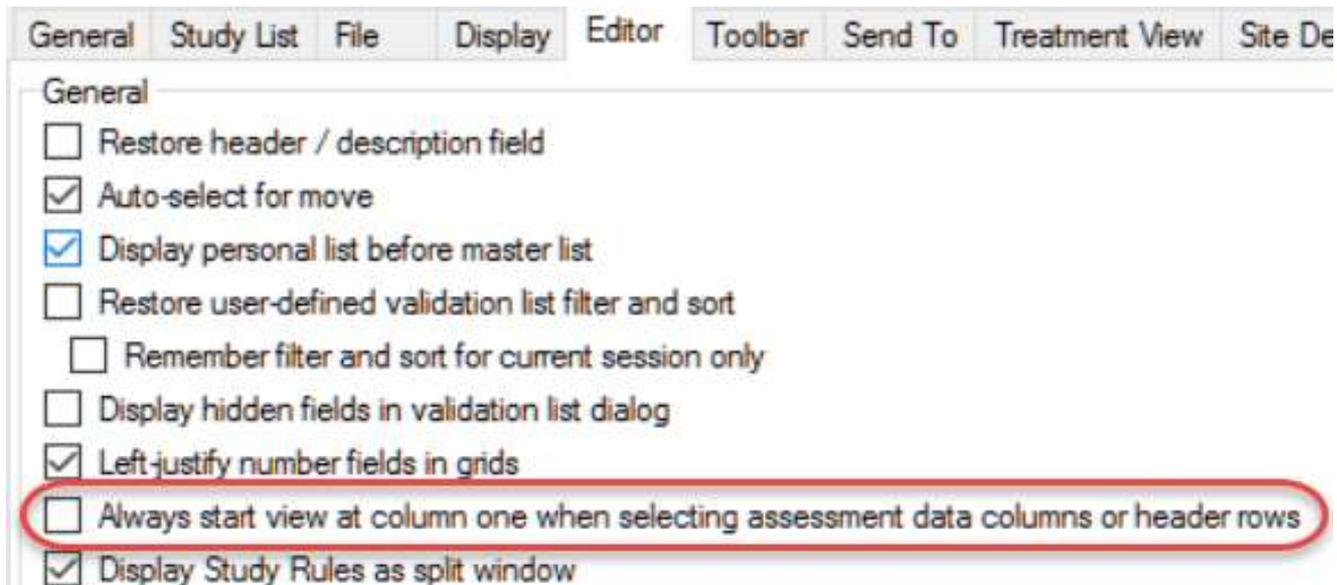
  

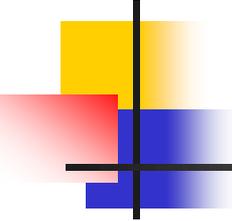
+ Sub	Rep	Blk	Col	Plot	Trit	1	2	3	4	5	6 (Calculated)
1	1	1	1	101	1	10	30	45			767.5
1	1	1	2	102	2	0	40	60			930.0
1	1	1	3	103	3	0	25	40			597.5



# Assessment Editor

Editor option to always start at column or header row 1 when selecting data columns or header rows





# Assessment Editor

---

- 'Data out of bounds' dialog identifies cause plus what action to take next

Data in column 1 must be within 0-100 when 'Rating Unit' is set to '%'.  
1000

Select 'OK' after entering a number within current data boundaries for this column.  
Select 'Cancel' to keep the out of bound data and return to assessment editor to change the limits.

Data in column 1 must be within 0-100 when the 'ARM Action Codes' contains 'P'.

Data in column 20 must be within 0-5 when 'Rating Unit' is set to '0-5'.

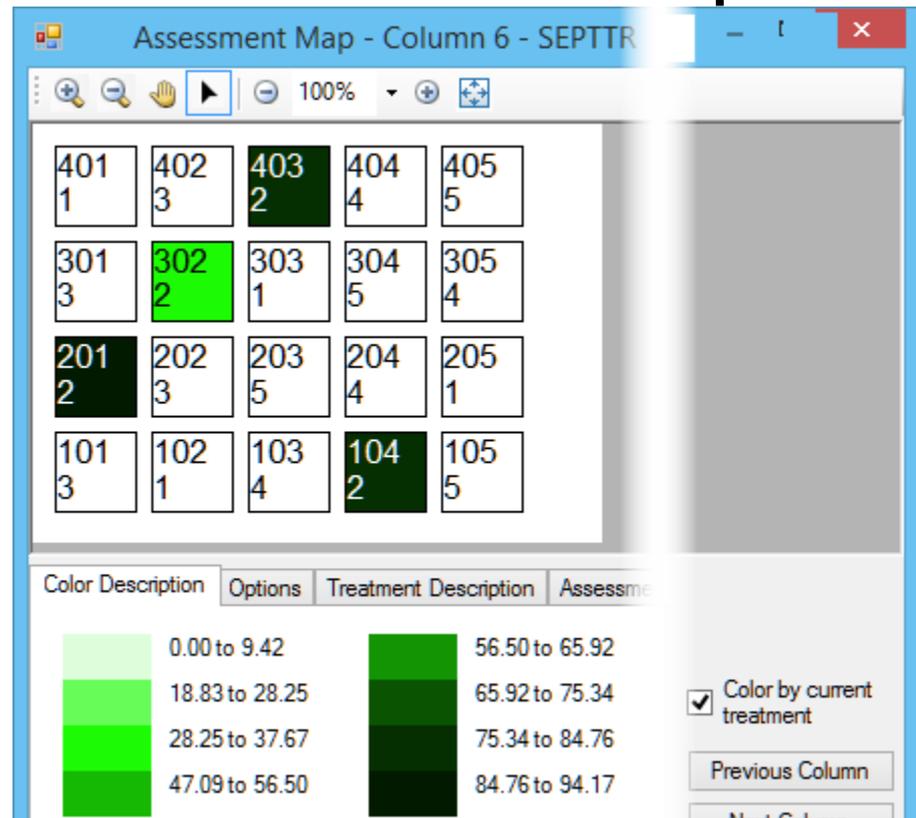
Data in column 1 must be within 1-10 when 'Scale Minimum' is set to '1' and 'Maximum Category' is set to '10'.

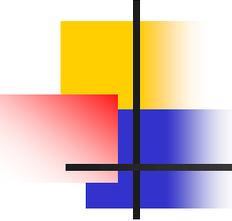
- Can continue pasting to add more assessment data into a data column that is already partially filled

# Assessment Map

## New 'Color by current treatment' option

- Easily review variation in each treatment
- Simpler to find position in each replicate for trial with many treatments





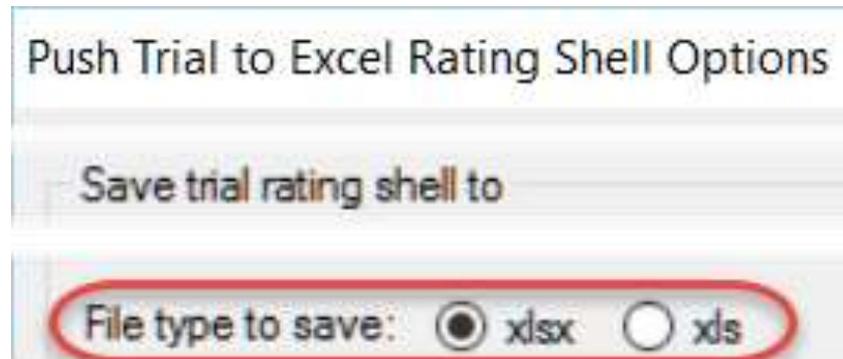
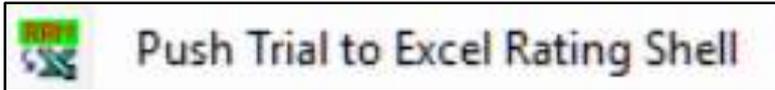
# Convert Yield

---

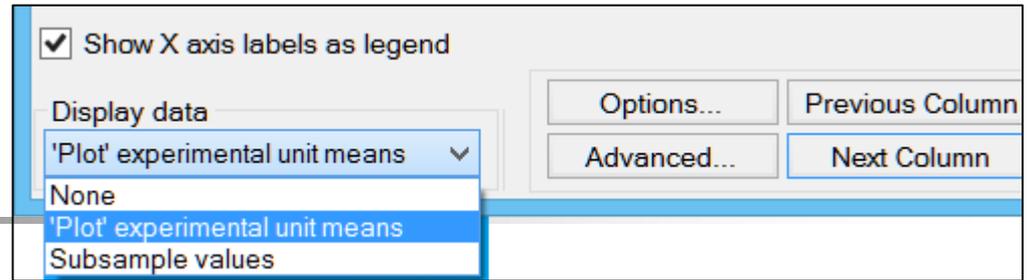
- Auto-fills 'Adjust to dry moisture percent' option from '% Standard Moisture' in Crop Description of the Site Description
- Converted yield is now 0 when original weight is 0 and adjusted moisture is missing

# Excel Rating Shells

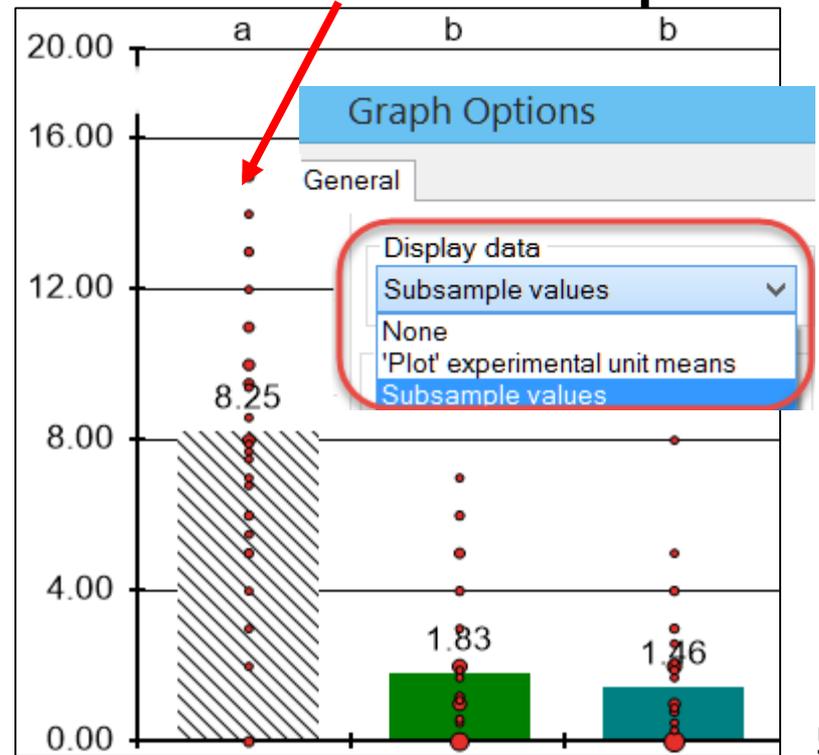
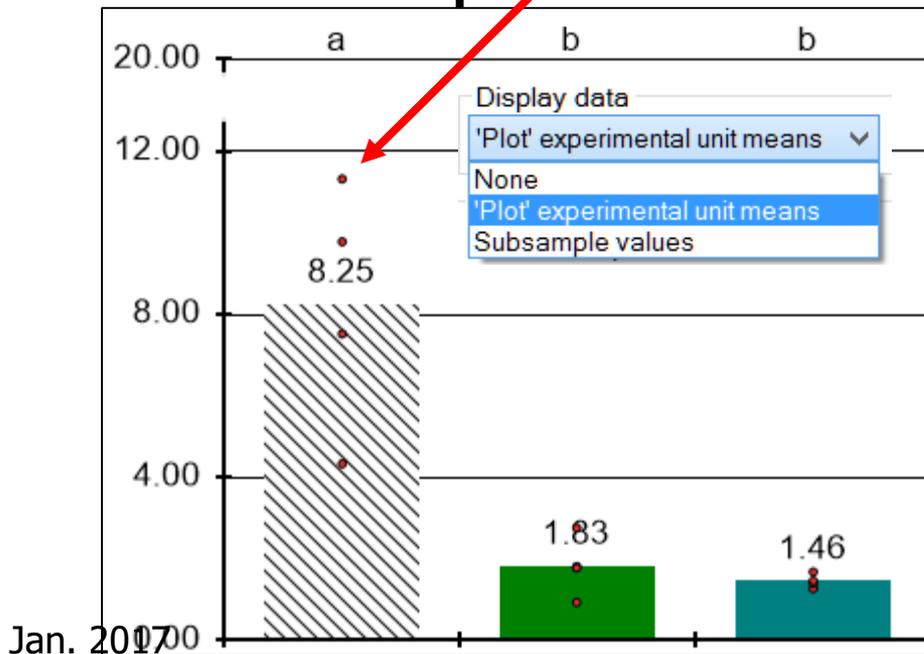
Can be Pushed and Pulled as Excel \*.xlsx using 'File type to save' option:



# Graphs

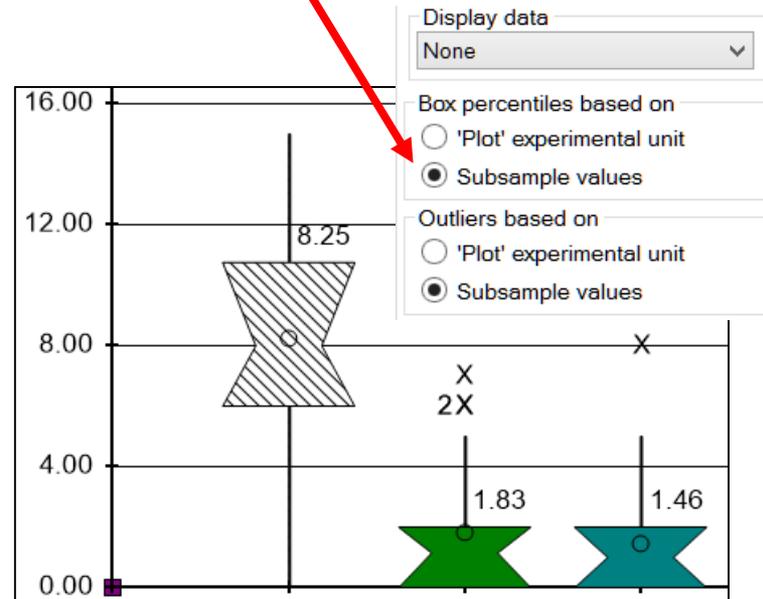
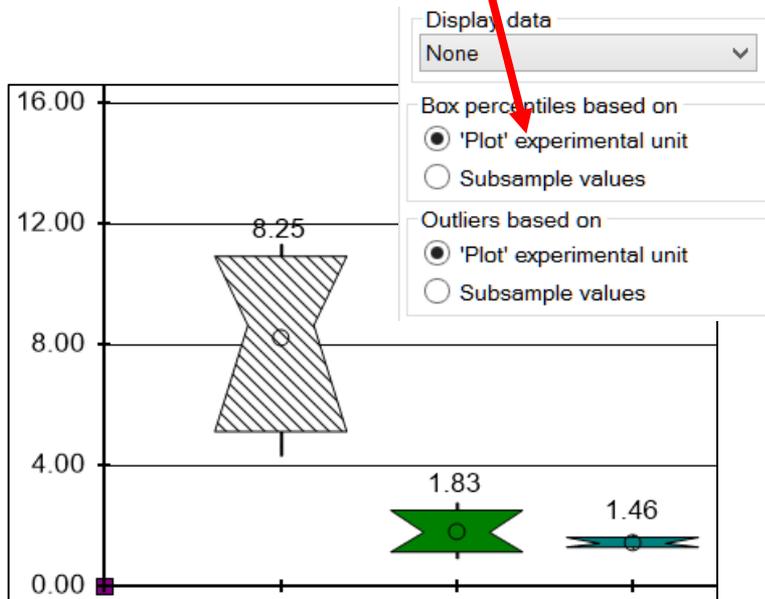


'Display data' option on viewer adds scatter graph showing plot or individual subsample values as points



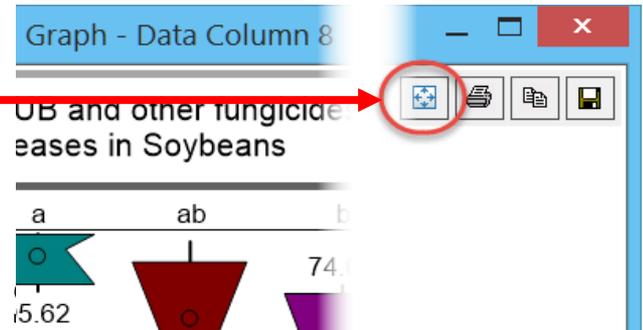
# Box-Whisker Graph

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

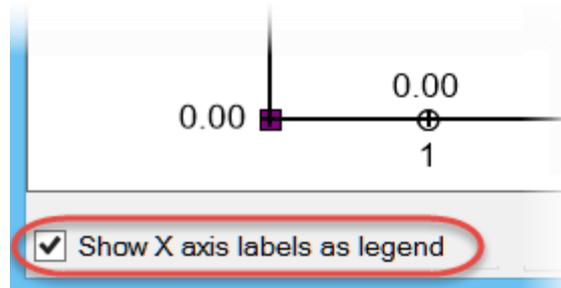


# Graphs

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



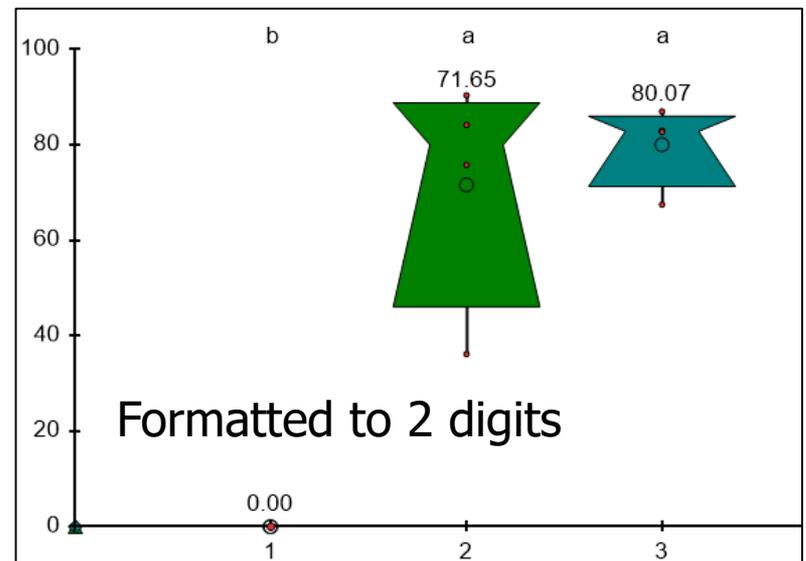
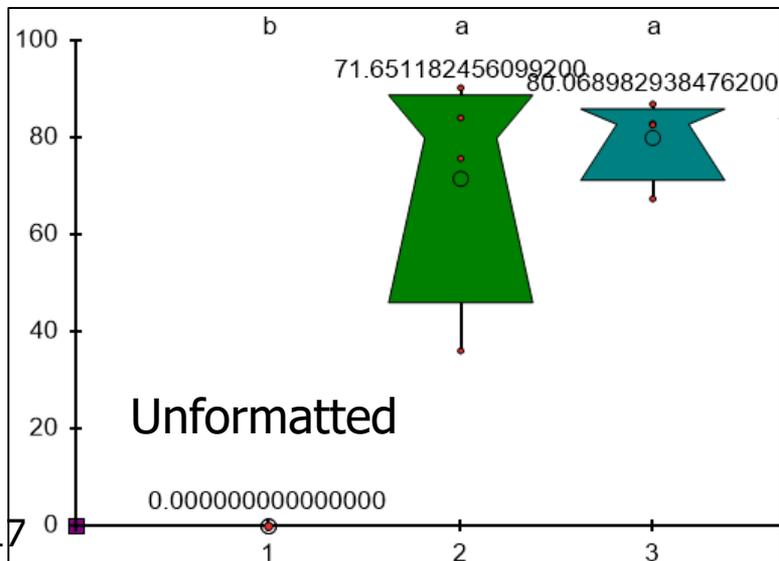
- Use 'Show X axis labels as legend' to better display detailed treatment information or many treatments

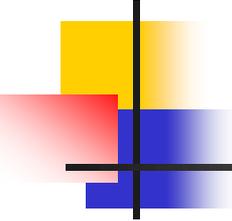


SEPTTR	Treatment
1	Untreated Check
2	Tub 0.5 L/ha
3	Tub 1 L/ha
4	Tilt 250 0.5 L/ha
5	Mico 60 1.5 L/ha; Fungol 1.25 L/ha

# Graphs

Format data labels on Bar and Line graphs based on 'Number of Decimals' specified in the Assessment column - avoids displaying too many decimal digits for calculated data columns



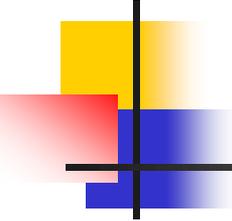


# Merge from Study - Use to:

---

- Build new protocol (trial plan) from a similar existing study
  - Even from a sponsor's customized protocol
- Add assessment headers (description)
- Add location, soil, and/or moisture from another trial in same field
- Combine 2+ identical trials at different locations into split-plot trial





# Treatments

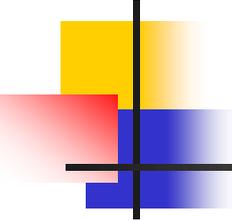
---

- 'Mixed' formulation concentration unit for pre-mixed products that contain different concentration units, such as g AI/L + BCFU/mL.
- Calculate Other Rate for Units ending in 'Row-m' or 'Row-FT'
- Calculate Other Rate even when 'Calculated Mix Size' in Settings is 0

# Edit - Delete Treatments

Selected treatments are marked to better show which treatments will be deleted

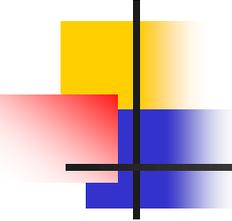




# Site/Protocol Description

- Grid columns auto-size to fit text in repeating section grids after pasting, such as when paste weather data
- Read-only grid fields display in italic font

	A		B		C		D	
<i>Application Date:</i>	<i>04/02/2014</i>		<i>04/12/2014</i>		<i>04/23/2014</i>		<i>05/03/2014</i>	
<i>Crop 1 Code, BBCH Scale:</i>	<i>MABSD</i>	<i>BPOM</i>	<i>MABSD</i>	<i>BPOM</i>	<i>MABSD</i>	<i>BPOM</i>	<i>MABSD</i>	<i>BPOM</i>
<i>Leaf Wall Area, Unit:</i>	<i>12903</i>	<i>m2/ha</i>	<i>16129</i>	<i>m2/ha</i>	<i>16129</i>	<i>m2/ha</i>	<i>16129</i>	<i>m2/ha</i>
<i>LWA Formula:</i>	<i>10000/3.1*2*2</i>		<i>10000/3.1*2.5*2</i>		<i>10000/3.1*2.5*2</i>		<i>10000/3.1*2.5*2</i>	



# Site/Protocol Description

## Application Equipment tab

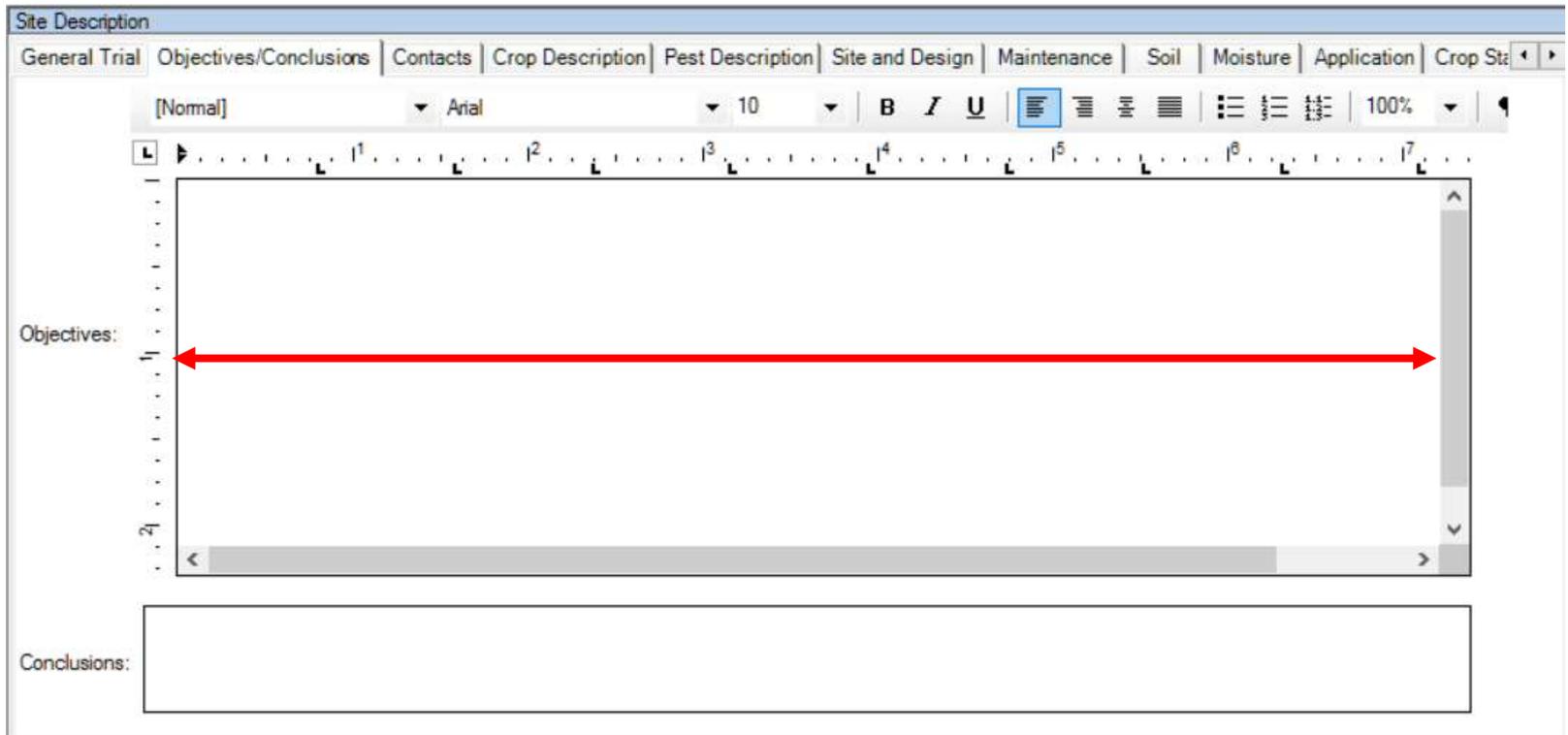
---

- Message to enter Mix Size per '/10000 m2 LWA' when Application Volume is 'L/10000 m2 LWA'
- Mix Size auto-copied from Settings only when Application Volume in Site Description is same as Settings
- 'Application Volume Unit' and 'Mix Size Unit' fields auto-filled only when associated value field contains an entry

# Site/Protocol Description

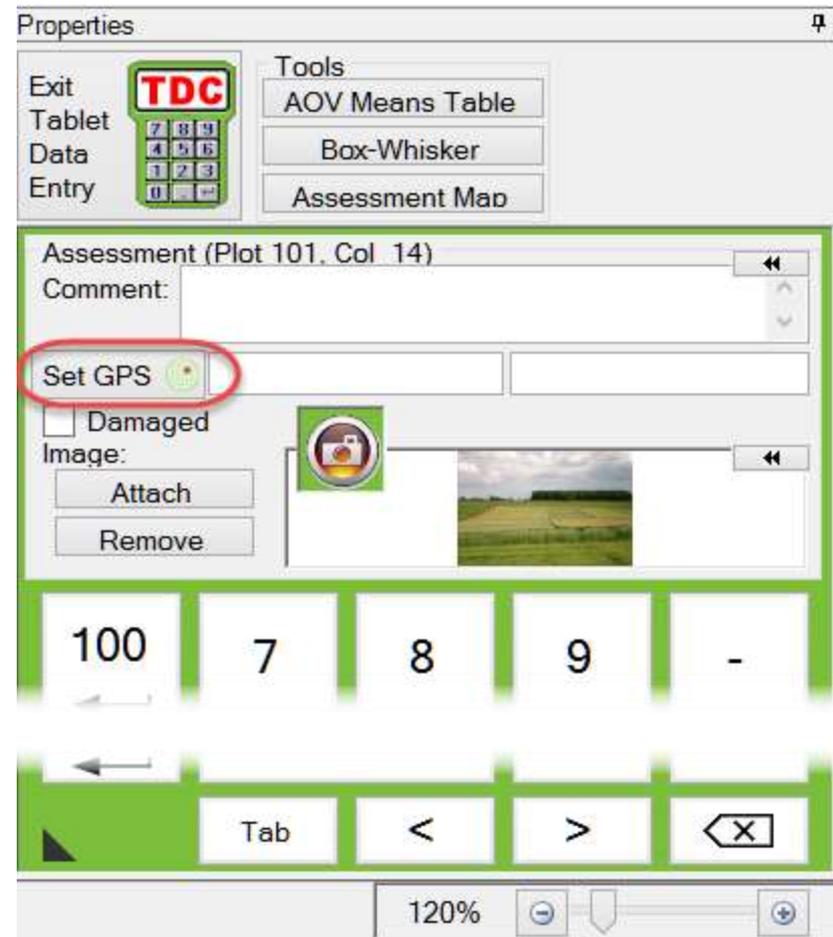
## Rich Text Comments

Automatically sized to match print margins



# Tablet Data Collector

- 'Set GPS' button records location of:
- Current data value
  - Current plot



# Tablet Data Collector

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

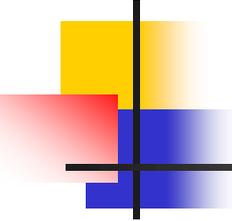
Asm. Date: 3

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

G-All7\_Fung\_T0003\_25-Jan-2016\_P101

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

Cancel    < Back    Finish



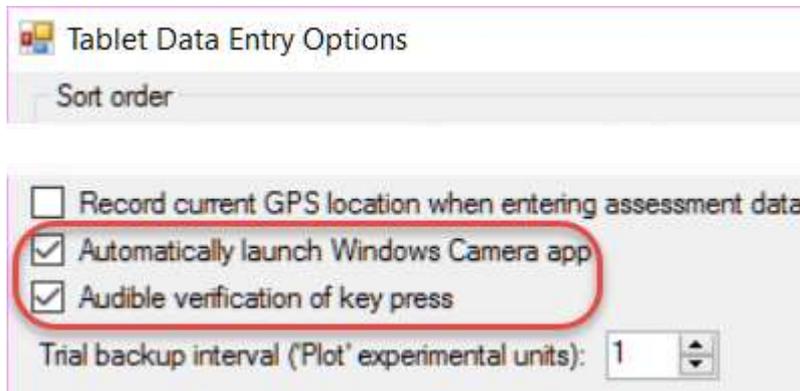
# Tablet Data Collector

---

- Starting Tablet Data Entry automatically starts camera app in Windows 10
- Remembers ARM + camera app size and position for both landscape & portrait mode
- Larger text on 'Copy Down', 'Missing', 'Enter', and 'Tab' keypad buttons
- Several more data column and editor sizing and scrolling enhancements

# Tablet Data Collector

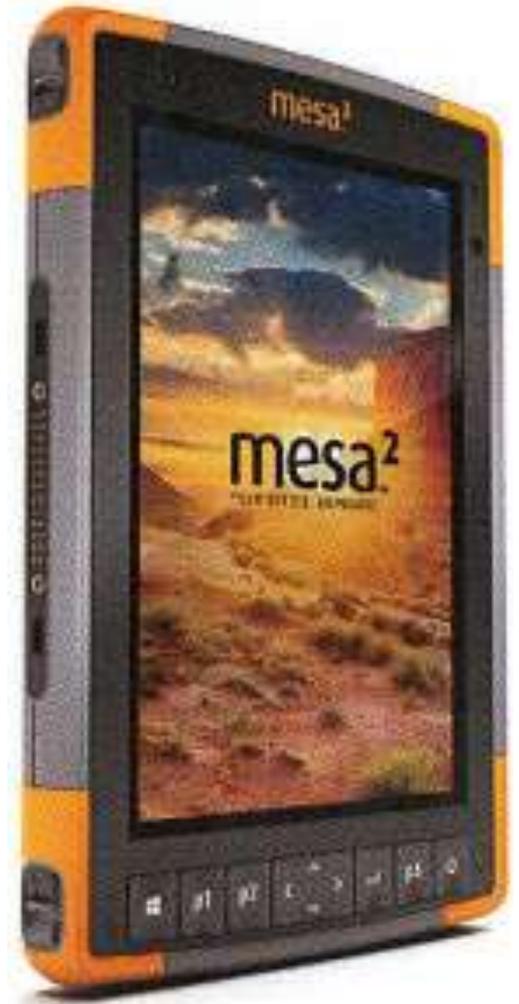
- Auto-open Camera app (Windows 10+)
- 'Audible verification of key press' makes a 'click' sound when each TDC keypad button is pressed



# Tablet Hardware

## HarvestMaster Mesa<sup>2</sup>

- 7 inch Windows 10 tablet
- Waterproof, dustproof
- Released 2Q2016



# GDM and HarvestMaster

ARM Connect to  
HarvestMaster  
Mirus Software:

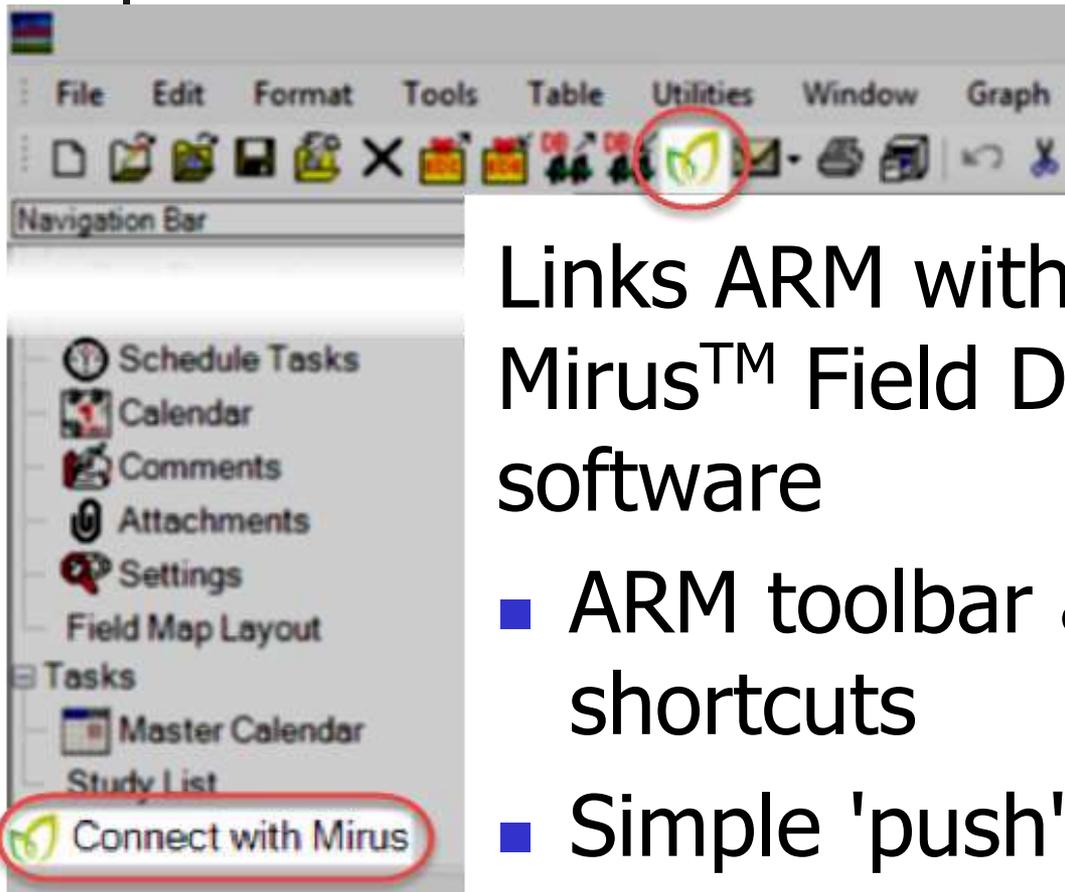


- ARM pushes field or trial map to Mirus
- Mirus uses with:
  - HarvestMaster Harvest Data Systems
  - Research sprayers
  - Other research equipment
- Mirus pushes harvest results to ARM

Details at GDM and HarvestMaster booths in exhibit hall



# Connect with Mirus



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

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

# Connect with Mirus

- Wizard interface for simplicity



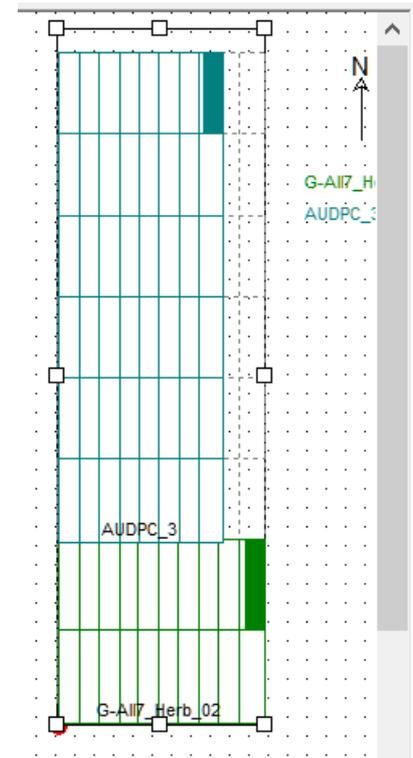
- Choose field or trial(s) from Study List

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

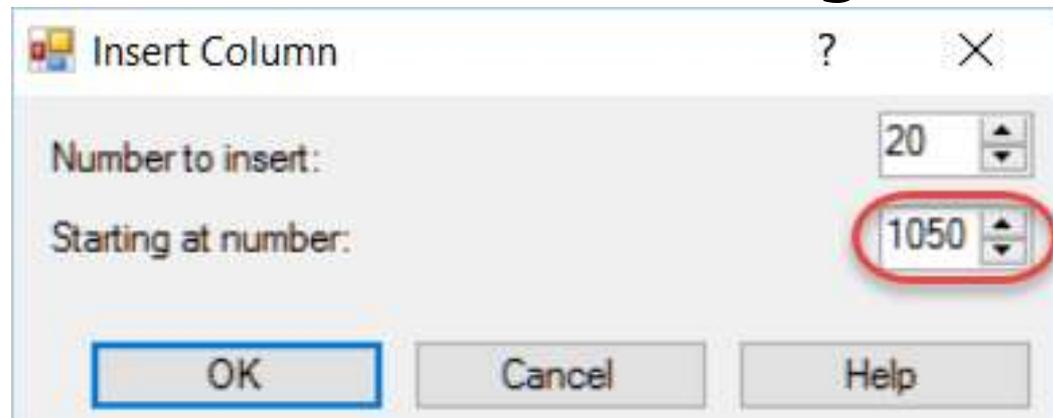
Major improvements to ARM field map to support layout and harvest of multi-trial fields, such as:

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



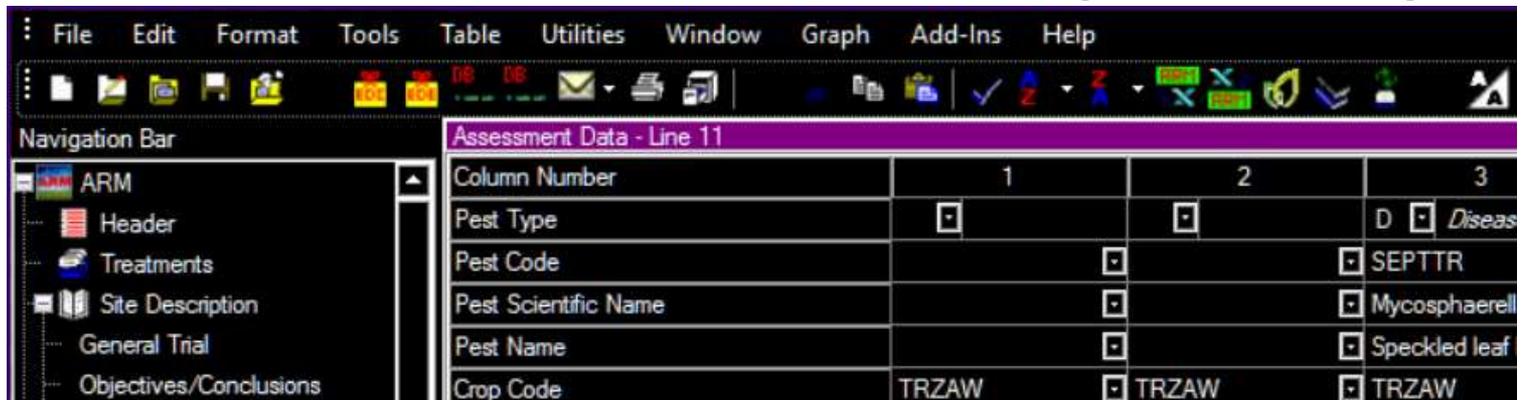
# Supports Larger Trials

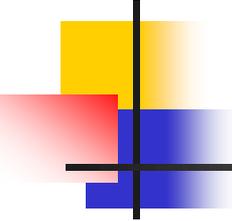
- Up to 9999 treatments per trial (previously 999, then 2500)
- Up to 32,767 data columns per trial (previously limited to 999 on some dialogs, such as when inserting data columns)



# High Contrast Display Button

- High contrast display button on ARM toolbar, changes between:
  - Standard display colors, and
  - Windows High Contrast colors
- Can improve readability in bright sunlight





# 'Save As' Enhancements

---

- Protect study rules supported only in ARM 2016/2015 or newer by preventing saving in ARM 9 format\*
  - No longer prompts about overwriting existing study file when keeping the same name and changing version
  - Defaults to .prt0/.dat0 in ARM 2017+
- \* ARM 9 became obsolete and unsupported after December 31, 2016

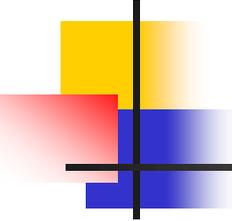


# GDMdef Study Definitions

Added Köppen-Geiger climate zones to new Climate Zone master list

 Climate Zone Master List (SART)

Climate Zone	Climate Zone	Type	Online Reference
Aw	Tropical Savannah	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
BSh	Arid Steppe Hot	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
BSk	Arid Steppe Cold	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
BWh	Arid Desert Hot	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
BWk	Arid Desert Cold	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
Cfa	Temperate, Perennial Rain, Hot Summer	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
Cfb	Temperate, Perennial Rain, Warm Summer	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
Cfc	Temperate, Perennial Rain, Cold Summer	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
Csa	Temperate, Dry, Hot Summer	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
Csb	Temperate, Dry, Warm Summer	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
Cwa	Temperate, Dry Winter, Hot Summer	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
Cwb	Temperate, Dry Winter, Warm Summer	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>
Cwc	Temperate, Dry Winter, Cold Summer	Köppen-Geiger	<a href="http://koeppen-geiger.vu-wien.ac.at">http://koeppen-geiger.vu-wien.ac.at</a>



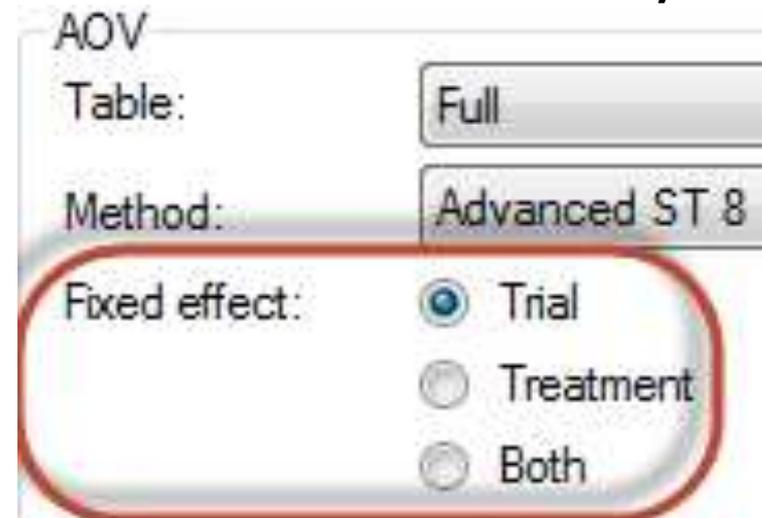
# Sponsor Customizations May be Set to Expire

---

- Sponsors may 'expire' their customized study definitions for contractors:
  - ARM displays warning messages when customization is expiring
  - Are identified as 'obsolete' in About ARM
  - Cannot create protocol or trial
  - Can request customization again from sponsor after expired

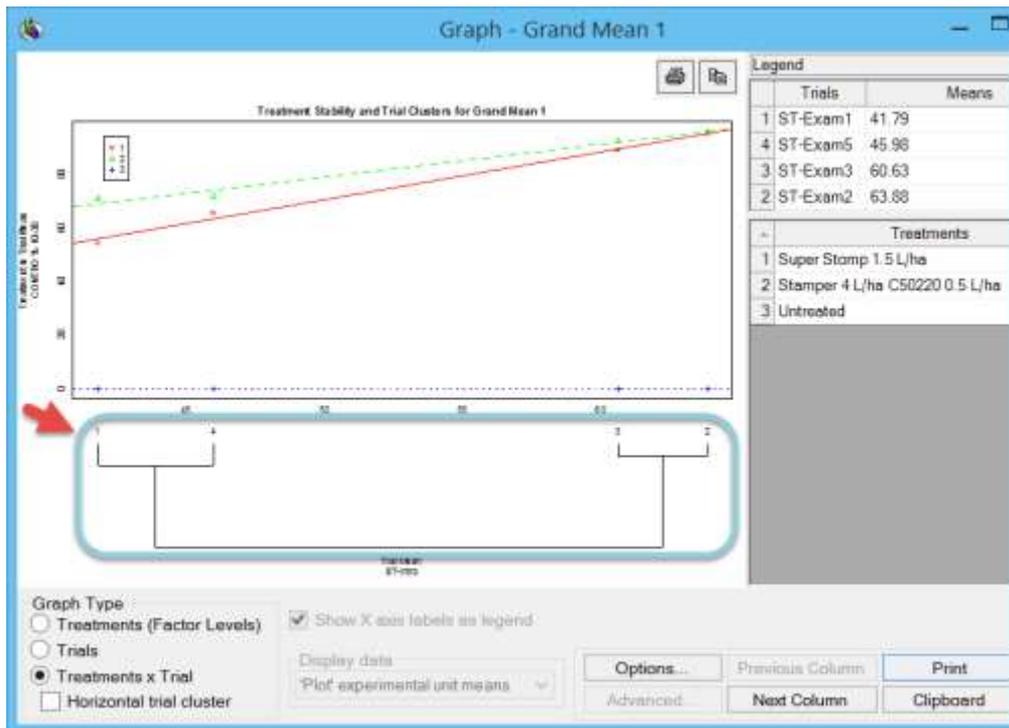
# Summary Across Trials

- ST Report option to print Mean Level CV
- Identify on ST Report the error term used for mean comparison tests when either Trial or Treatment is random, as defined on ST Summary Options dialog

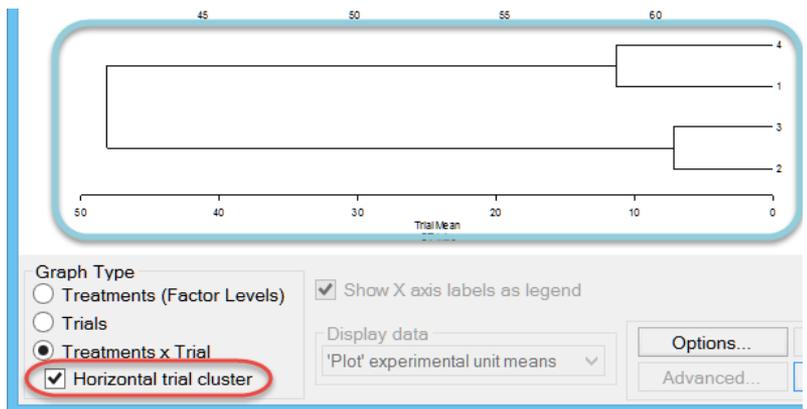


# ST Graph

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



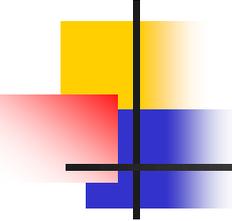
- Better displays large number of trials
- Includes its own X-axis



# Licensing

- Less frequent internet connect to verify license information
- More license information on About ARM





# ARM 2017

---

- Is available now
- Is a key benefit of the new Annual Software Maintenance payment
- Automatically provided to clients using ARM 2016 via electronic download by ARM Check for Updates program