

# ARM 2024 Changes

# Protocol Signature

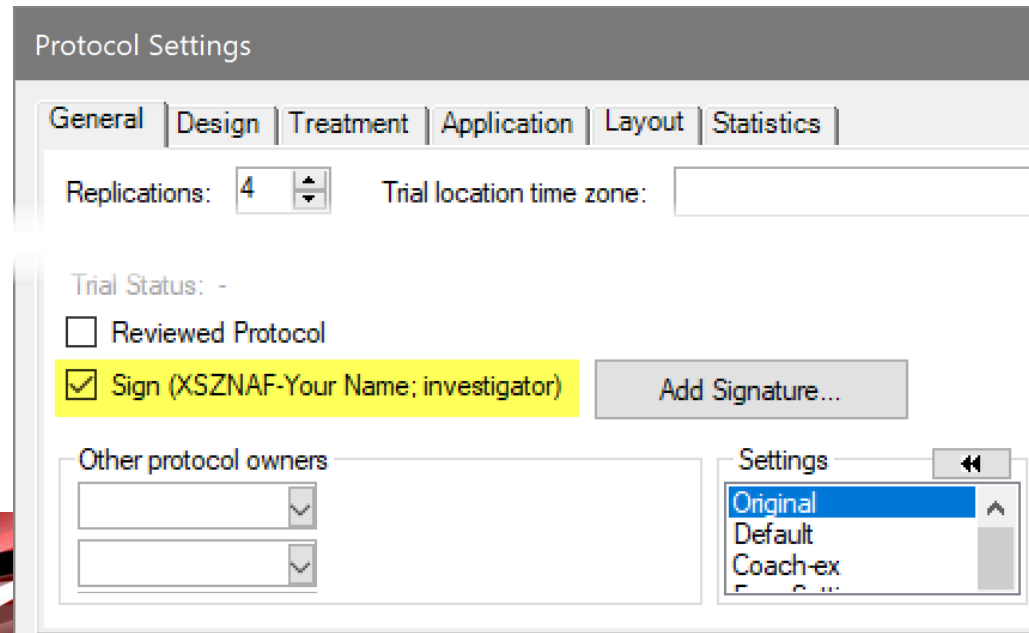
# Protocol Signature

Add your signature to a protocol (*just like the Trial Signature*)

1. Protocol Settings > **Sign** checkbox
2. Create your signature in user profile
3. Confirm your role in the protocol (fills from Contacts)



The 'Add Signature' dialog box is shown. It has a title bar with a close button. The main text says 'Select the name of the person signing the protocol and verify the signature.' Below this is a 'Contacts, Role:' label and a dropdown menu. The dropdown is open, showing two options: 'R.E. Cearch; study director' and 'Your Name; investigator'. Below the dropdown is a 'Profile Signature for First M Name' section with a large text area containing a handwritten signature. At the bottom right is an 'Update Signature...' button. At the bottom left, there is a red warning message: 'Once a signature is added, no further changes can be made to the protocol. The protocol will need to be re-signed if changes are made.'



The 'Protocol Settings' dialog box is shown. It has a title bar and several tabs: 'General', 'Design', 'Treatment', 'Application', 'Layout', and 'Statistics'. The 'General' tab is selected. It contains fields for 'Replications' (set to 4) and 'Trial location time zone'. Below these is a 'Trial Status: -' section with a checkbox for 'Reviewed Protocol' and a checked checkbox for 'Sign (XSZNAF-Your Name; investigator)'. To the right of the 'Sign' checkbox is an 'Add Signature...' button. Below the 'Sign' checkbox is a section for 'Other protocol owners' with two dropdown menus. To the right of this section is a 'Settings' dropdown menu with options: 'Original', 'Default', 'Coach-ex', and 'F... C...'. The 'Original' option is selected.

# Protocol Signature

Add your signature to a protocol


- Include signatures on reports (Global Report options)

29 May 2024 (2024-1.prt0) ARM 2024.1 Signature Page 2 of 2

**New Company**

ARM ST Tutorial Example Product Screening Number 1

Protocol ID: ST-Exam-241	Location:
Trial ID:	Trial Year: 2024
Study Director: R.E. Search	Sponsor Contact:
Investigator: Your Name	



29 May 2024, XSZNAF-Your Name; investigator

- Add a study rule to require a signature

Rule	Type	Editor	Field	Condition
1	Sign	Protocol	Required at Revision Status one-year/final	Everyone in my company

Protocol Validation Messages

**Validation Messages**

**Errors**

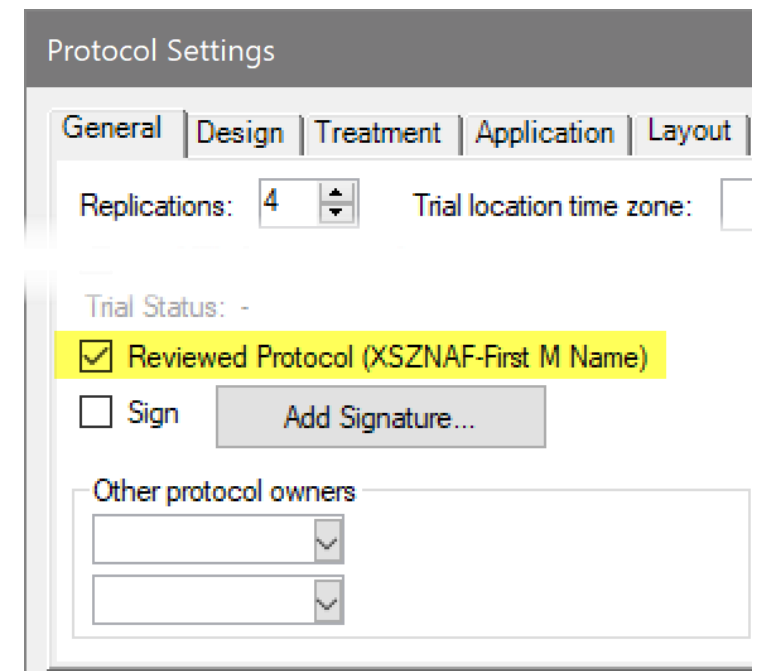
A signature by 'anyone in my company' is required for this study. (Study Rule 1)  
Add a signature on Protocol Settings.

# Reviewed Protocol

# Reviewed Protocol

Mark a protocol as Reviewed, from Settings > General tab

- Automatically clears when significant changes are made to the protocol  
(*not cleared for Status, Trial Location changes*)
- Record kept in Notes every time protocol is Reviewed by someone:



Protocol Settings

General | Design | Treatment | Application | Layout

Replications: 4 Trial location time zone:

Trial Status: -

☒ Reviewed Protocol (XSZNAF-First M Name)

☐ Sign Add Signature...

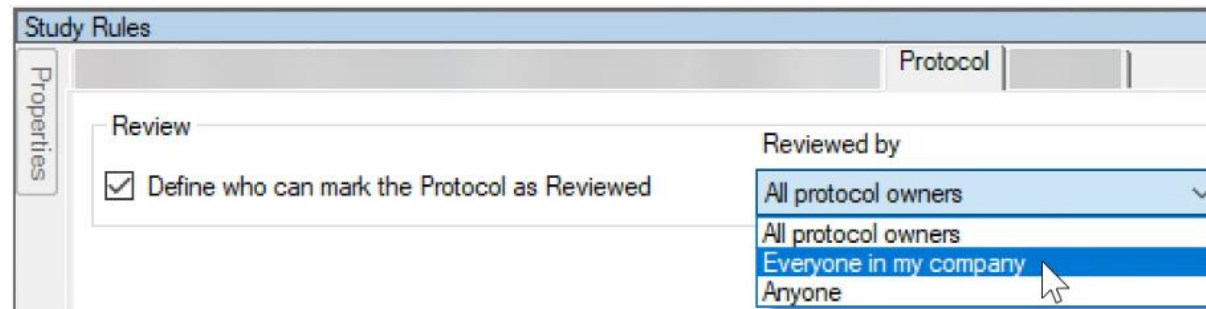
Other protocol owners

## Notes

No.	Context	Date	By	Notes
1.	REVIEW	28 May 2024	First M Name	Automatically added by ARM: Protocol Reviewed

# Reviewed Protocol

Study Rule: Define **who** can mark a protocol as Reviewed



- Essentially creates a “review group”
  - E.g. Sponsor wants internal review, and CRO should not participate
- Note: does not *require* that Reviewed is checked

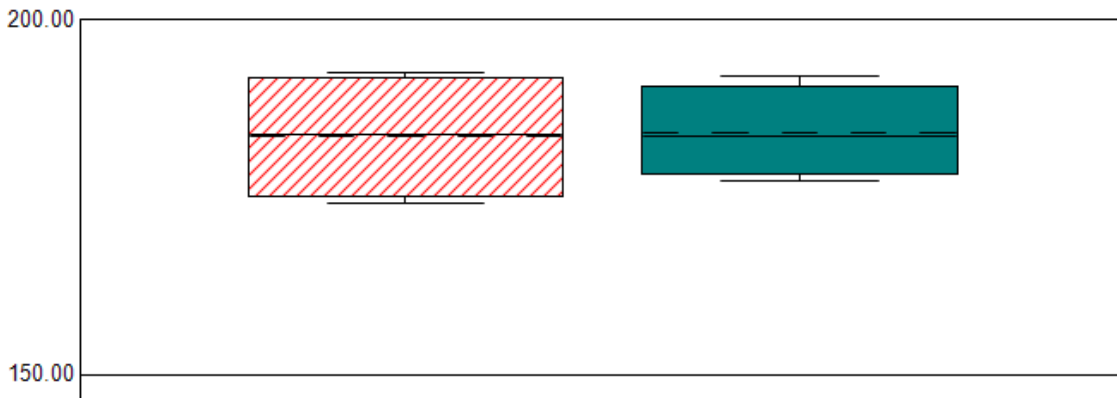
# Equivalence Testing

# Equivalence Testing

AOV: same letter implies treatments are “not significantly different”

But does NOT mean the two are “significantly the same”

Use Equivalence Tests to determine if treatments are effectively the same



*Example:*

*new formulation of a standard product*

*We want to claim that our new product is just as good as the standard*

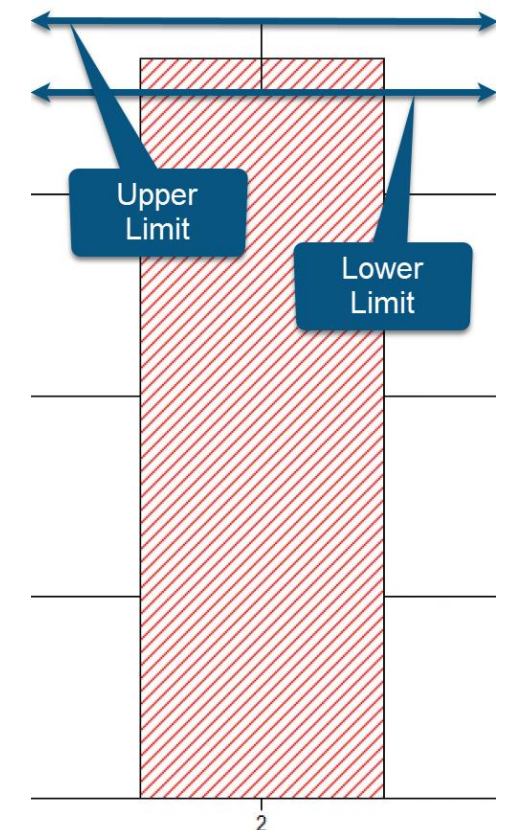
# Equivalence Testing

Step 1: Researcher defines how large of a difference is insignificant?

- Percent of standard (e.g. within 3% of standard trt)
- Absolute value (e.g. within 5 bushel of standard)
- Effect size ( $Cohen's\ d = [Trt - Std] / StDev$ )

Called the **Limit** in ARM, this difference creates an Equivalence Interval

*This is like a “plus or minus” range about the standard trt for equivalent performance*



# Equivalence Testing

## Step 2: Hypothesis Test for equivalence

$H_0$ : The difference between the treatments is **outside** the equivalence interval

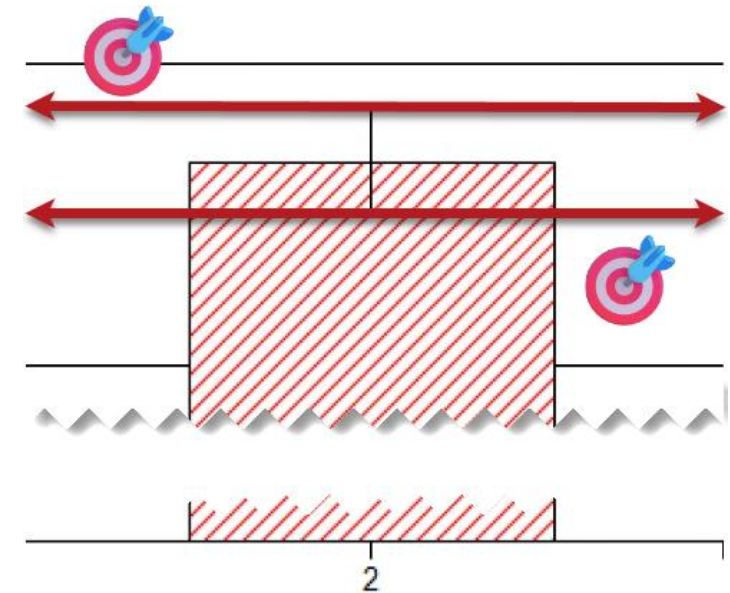
If we can reject  $H_0$ , we can conclude the difference is *inside* the interval, and thus we have equivalence

To test “outside the interval” we test:

Compared treatment is *less than* lower limit

Compared treatment is larger than the upper limit

*ARM Method = Two one-sided tests (TOST)*



# Equivalence Testing

An example: 7.5 % of standard

Turn on AOV report option  
“Include equivalent tests”

P-value for “smaller than lower” (1)  
and “larger than higher” (2) are listed

Need BOTH to be significant to have equivalence

Trial Settings

General | Design | Treatment | Application | Layout | Statistics

Planned Comparisons | **Equivalence Tests**

	Method	Limit Basis	Limit	Standard	Alternative	Description
1	Two one-sided tests (TOST)	Percent of standard	7.5	2	3	Product equiv 7.5%
2*						

AOV Means Table Report Options

Report Options | Descriptive Statistics | General Summary | Report Preview

Mean comparison test  
Test: Student-Newman-Keuls

Treatment comparisons

☐ Include planned comparisons Options...

☐ Exclude untreated treatment(s) from analysis

☒ Include equivalence tests Options...

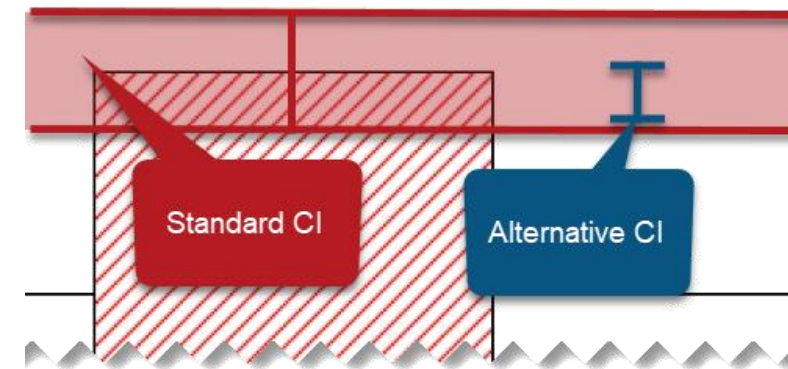
Equivalence Tests	
Product equiv 7.5%?	
Mean Difference	1.76
NHST t	2.08
NHST P(t)	0.05
TOST(Lower) t	7.17
TOST(Lower) P(t)	<0.01
TOST(Upper) t	-3.01
TOST(Upper) P(t)	<0.01
Equivalence established	
NHST Power	0.50

# Equivalence Testing

## Alternative Step 2: Confidence Interval for equivalence

Define a  $(1-\alpha)$ , two-tailed confidence interval based on Limit from Step 1

If calculated “Alternative CI” is within this Standard Equivalent interval, then we have equivalence



	Method	Limit Basis	Limit	Standard	Alternative	Description
1	Confidence Interval	Percent of standard	7.5	2	3	Product equiv 7.5%?

Equivalence Tests	
Product equiv 7.5%?	
Mean Difference	1.76
Standard Equiv. Int.	(-4.30,4.30)
Alternative CI	(0.28,3.23)
Equivalence established	
NHST Power	0.50

# Summary

Use **Equivalence Tests** to determine if treatments are effectively the same  
Choose a **Limit** based on what is an inconsequential difference

Link to full presentation:

<https://gdmdata.com/media/documents/EquivalenceTesting.pdf>

- Statistical calculations and theory
- More examples (from literature and real-life)

# Assessment Editor

# Copy Assessment Headers

New shortcut buttons to copy/paste entire header description

- Copy appears only in columns with header information to copy
- Paste appears only in completely empty headers

Assessment Data - Line 2

+	Column Number	1	2	3					
-	Rating Date	31 May 2024							
☑	Standard Evaluation (SE)								
-	Part Rated	PLANT P							
-	Rating Type	CONTRO							
-	Rating Unit	%							
-	Rating Min/Max/Interval	0 100							
-	Number of Subsamples	1							
☑	Crop								
-	Crop Type, Code	C ZEAMD							
-	BBCH Scale	BCOR							
-	Crop Scientific Name	Zea mays indentata							
-	Crop Name	Dent com							
-	Crop Stage Scale	BBCH							
-	Crop Stage Majority/Min/Max	14-16							
+	Pest	TTTTT							
+	Sub	Rep	Blk	Col	Plot	Trt	1	2	3
🔒	1	1	1	1	101	2	100		
📄	1	1	1	2	102	3	100		

# Required Assessment

Added Required field to header to describe necessity of assessment/SE:

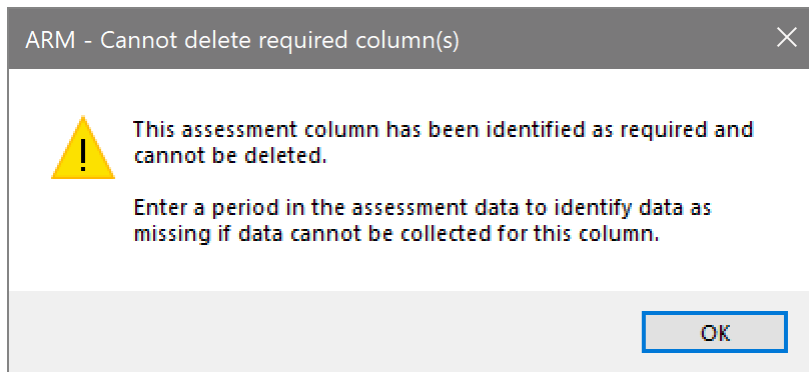
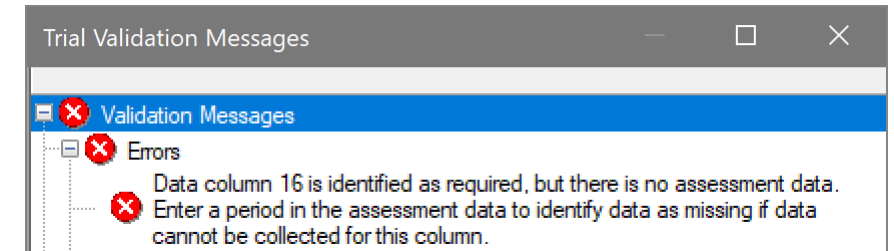
- REQUIR – required rating which **must** be performed
- ALTERN – alternative, a rating is required but allows a **choice** of at least 1 of assessments/SEs marked as ALTERN
- OPTION – optional rating, but **recommended** if applicable

Copied from SE Definitions tab, when applicable

[-] Standard Evaluation (SE)	
[-] SE Name	
[-] SE Description	
[-] Required	
[-] Part Rated	ALTERN OPTION REQUIR Edit...
[-] Rating Type	
[-] Rating Unit	

# Required Assessment

- When Status=Final, validation error occurs if any REQUIR columns have no data



- Prevent a column from being deleted by choosing REQUIR

- Tip: Lock this field with a rule to prevent editing the value*

# Rating Interval

Define numerical interval between valid assessment values

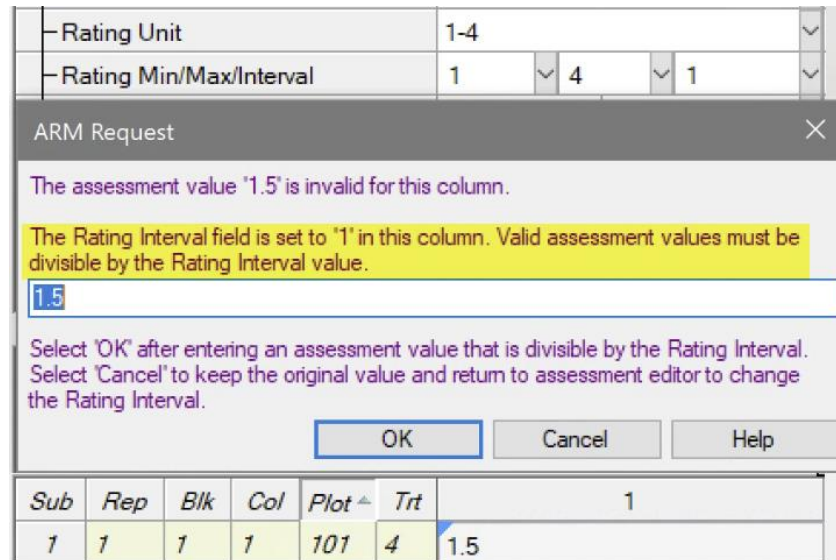
- E.g. Interval=1 for whole numbers, 0.25 for values like 0.75, 1.25

Rating Date	Mar-5-2024	▼
<input type="checkbox"/> Standard Evaluation (SE)		
SE Name	ZUSI014	▼
Part Rated	ROOT	▼
Rating Type	DAMINS	▼
Rating Unit	0-3NCR	▼
Rating Min/Max/Interval	0	3 0.25 ▼
Number of Subsamples	1	

Sub	Rep	Blk	Col	Plot ^	Trt	1
1	1	1	1	101	4	0.75
1	1	1	2	102	1	1
1	2	1	3	103	1	0.5
1	2	1	4	104	4	2.25

# Rating Interval

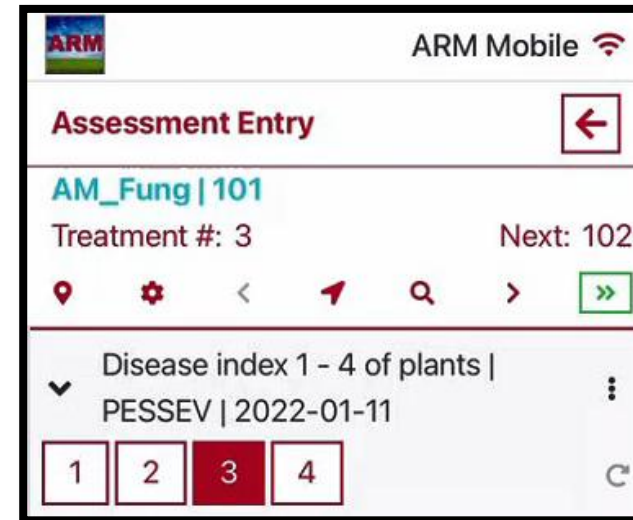
- ARM prompts if invalid data value is entered:



The screenshot shows an 'ARM Request' dialog box with a close button (X). The message states: 'The assessment value '1.5' is invalid for this column.' Below this, a yellow highlighted box explains: 'The Rating Interval field is set to '1' in this column. Valid assessment values must be divisible by the Rating Interval value.' A text input field contains '1.5'. Further instructions read: 'Select 'OK' after entering an assessment value that is divisible by the Rating Interval. Select 'Cancel' to keep the original value and return to assessment editor to change the Rating Interval.' At the bottom are 'OK', 'Cancel', and 'Help' buttons. In the background, a table is visible with columns: Sub, Rep, Blk, Col, Plot, Trt, and a value column. The last row shows values: 1, 1, 1, 1, 101, 4, and 1.5.

Sub	Rep	Blk	Col	Plot	Trt	
1	1	1	1	101	4	1.5

- Intervals define rating shortcut buttons in ARM Mobile:



The screenshot shows the 'ARM Mobile' interface for 'Assessment Entry'. It displays 'AM\_Fung | 101' and 'Treatment #: 3' with a 'Next: 102' link. Below this is a row of navigation icons: a location pin, a gear, left and right arrows, a magnifying glass, and a double right arrow. The main section is titled 'Disease index 1 - 4 of plants | PESSEV | 2022-01-11'. At the bottom, there are four rating buttons labeled 1, 2, 3, and 4. Button 3 is highlighted in red, indicating the current selection.

# Copy Coordinates

Right-click to copy GPS coordinates to Latitude/Longitude of LL Corner fields in Site Description

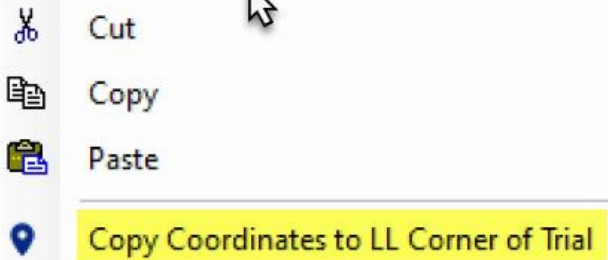
Sub	Rep	Blk	Col	Plot	Lat	Long
1	1	1	3	103		
1	2	2	1	201		
1	3	3	3	303		
1	4	4	4	404		
1	1	1	1	101	44.3078	-96.7971
1	2	2	3	203		

Assessment (Plot 101, Col 1)

Comment:

Barcode:

GPS:

 Cut  
Copy  
Paste  
Copy Coordinates to LL Corner of Trial

Site Description

General Trial Regulations Objectives/Conclusions Contacts Crop Description

**General Trial Information**

Completion Date:  Last Possible Tour Visit:

**Trial Location**

City:

State/Prov.:  SD

Postal Code:

Upper Left:

Latitude of LL Corner °:  N

Longitude of LL Corner °:  W

# Properties Panels

Size and state of assessment panels are now remembered:

- when leaving and coming back to Assessment editor
- closing ARM and opening a different file

*No more re-sizing Column Diagnostics for every trial that is reviewed!*

Column 10 Diagnostics

**Diagnostics**

☐ Include spatial models

Raw Graphs

Show... Layout: 4 X 2

Statistics (P)	Raw	IID	AL	AS	AA	AR
N	20	20	20	20	20	20
Unique	17	19	19	19	19	19
Analyzed	19	19	19	19	19	19
Missing	0	0	0	0	0	0

**Recommendations**

Basis: Assessment Values

AR Graphs

Show... Layout: 4 X 2

	Code	Test Statistic	Value	Comment
1	AR	Levene's	12.135	Homogeneity of variances not stabilized by availa
2	IID	Shapiro-Wilk	0.992	Does not fail general test of normality of residuals
3	IID	Skewness	0.03	Does not fail test of skewness of residuals
4	IID	Kurtosis	-0.215	Does not fail test of excess kurtosis of residuals

Save to RStudio

Previous Next

# Timing fields

Updated name of Timing header fields:

☐ Timing		
Rating Timing	A1	
Days After First/Last Appl.	36	36
Treatment Appl. Interval	36 DA-A	
Planting Interval	21 DP-1	
Days After Emergence	11 DE-1	
Pest Establishment Interval	50 DI-1	

Removed references to *evaluation* because this is the assessment editor

# Tablet Data Entry mode

Reduced width of header prompts to fix more on the screen

Before

Column Number	1	
Assessed By		
Rating Date		
[-] Standard Evaluation (SE)		
[-] SE Description		
[-] Part Rated	PLANT	P
[-] Rating Type	COUPLA	
[-] Rating Unit	PLANT	
[-] Rating Min/Max/Interval		
[-] Sample Size	1	PLOT
[-] Subsamples	1	
[+] Crop		
[+] Pest	AMAPA	
Sub	Plot	1
1	101	

After

Column Number	1	
Assessed By		
Rating Date		
[-] SE		
[-] SE Description		
[-] Part Rated	PLANT	P
[-] Rating Type	COUPLA	
[-] Rating Unit	PLANT	
[-] Min/Max/Interval		
[-] Sample Size	1	PLOT
[-] Subsamples	1	
[+] Crop		
[+] Pest	AMAPA	
Sub	Plot	1
1	101	

# Site Description

# Controlled Environment

Greenhouse tab renamed and generalized for other chambers/environments

Site Description

Weather

Controlled Environment

Application

Crop Stage at Appl.

Pest Stage at Appl.

Appl. Equipment

Equipment

Controlled Environment (Greenhouse/Growth Chamber)

Insert row with Shift+F7, Delete current row with Shift+F8

No.	Date	Equipment No.	Name	Light Equipment No.	Light Equipment Name	Light Intensity	Light Intensity Unit
1.	Nov-18-2024	1	BrkgsWalkInGC	2	BrkgsUV001	11	W/m2
2.							

<

Steps to define and save Equipment:

1. Document details of equipment, at least Type and Method/Sub-type
2. Enter Equipment Name (free text)
3. Select drop-down button (or F9) to add to list for use in other trials

Equipment			
	1.	2.	
Equipment Name	BrkgsWalkInGC	BrkgsUV001	E

Equipment Name List

Equipment Name	Type	Method/Sub-type
BrkgsIrrig	IRRIGATION	SPRINK
BrkgsUV001	LIGHT	UV
BrkgsWalkInGC1	CONTROLENV	GRWCHM
ZX5-Drone	Drone	Trimble ZX5

ARM - Information



No matches found.  
Add item to list?

Yes

No

# Controlled Environment

Greenhouse tab renamed and generalized for other chambers/environments

Greenhouse ID is now **Equipment No.**

1. Define greenhouse/chamber on Equipment tab
2. Link to Controlled Environment daily entries

**Equipment**  
Insert Equipment with Shift+F7, Delete current Equipment with Shift+F8

	1.	2.
Equipment Name	BrkgsWalkInGC	
Type	CONTROLENV	
Method/Sub-type	GRWCHM	

Method/Sub-type List

Display All ★ Favorites

Method/Sub-type	Method/Sub-type Description	Category
DEWCHM	dew chamber	CONTROLENV
FLDCHM	field simulation chamber	CONTROLENV
GRNHSE	greenhouse	CONTROLENV
★ GRWCHM	growth chamber	CONTROLENV
INCUBT	incubator	CONTROLENV
UVCHM	UV chamber	CONTROLENV
WLKCHM	walk-in growth chamber	CONTROLENV

## Controlled Environment (Greenhouse/Growth Chamber)

No.	Equipment No.	Name	Light Equipment No.	Light Equipment Name
1.	1	BrkgsWalkInGC		

Equipment No. List

Equipment No.	Name	Type	Sub-type	Sub-type Description
1	BrkgsWalkInGC	CONTROLENV	GRWCHM	growth chamber

Lists equipment defined only in current trial

# Controlled Environment

Greenhouse tab renamed and generalized for other chambers/environments

Document **light** information:

1. Define light equipment on Equipment tab (and re-use in any trial)
2. Link to Controlled Environment daily entries

**Equipment**  
Insert Equipment with Shift+F7, Delete current Equipment with Shift+F8

	1.	2.
Equipment Name	BrkgsWalkInGC	BrkgsUV001
Type	LIGHT	LIGHT
Method/Sub-type	UV	UV

Method/Sub-type List

Method/Sub-type	Method/Sub-type Description	Category
LED	light-emitting diode (LED) light	LIGHT
NATURAL	natural light	LIGHT
★ UV	ultraviolet (UV) light	LIGHT

**Controlled Environment (Greenhouse/Growth Chamber)**

No.	Date	Equipment No.	Name	Light Equipment No.	Light Equipment Name	Intensity	Light Intensity Unit
1.	Nov-18-2024	1	BrkgsWalkInGC	2	BrkgsUV001	11	W/m2
2.							

Light Equipment No. List

Light Equipment No.	Light Equipment Name	Type	Method	Method Description
2	BrkgsUV001	LIGHT	UV	ultraviolet (UV) light

# Controlled Environment

# Greenhouse tab renamed and generalized for other chambers/environments

## Document **irrigation** details:

1. Define irrigator details on Equipment tab (and re-use in any trial)
2. Link to Controlled Environment daily entries

## Equipment

Insert Equipment with Shift+F7, Delete current Equipment with Shift+F8

	1.	2.	3.
Equipment Name	Brkgslrrig	1	Brkgslrrig
Type	IRRIGATION		IRRIGATION
Method/Sub-type	TRICKL		TRICKL

Method/Sub-type List

Method/Sub-type	Method/Sub-type Description	Category
SUBIRR	subimigation/ebb-flow	IRRIGATION
TRICK	trickle	IRRIGATION
★ TRICKL	trickle/drip	IRRIGATION
TRIFLO	trickle + flood/drip + flood	IRRIGATION

**Controlled Environment (Greenhouse/Growth Chamber)**

No.	Date	Equipment No.	Name	Equipment No.	Equipment Name	Irrigation Method	Irrigation Method Description	Irrigation Frequency	Irrigation Duration	Irrigation Duration Unit
1.	Nov-18-2024	1	BrkgsWalkInGC	3	BrkgsIrrig	TRICKL	sprinkler	3	30.0	MIN
2.										

2

Irrigation Equipment No. List

Irrigation Equipment No.	Irrigation Equipment Name	Irrigation Method	Irrigation Method Description	Type
3	BrkgsIrrig	TRICKL	trickle/drip	IRRIGATION

# Experimental Unit

Experimental Unit field used in place of “Plot” in ARM prompts

Site Description

Site and Design

Treated Plot Width: 3

Treated Plot Length: 12

Replications: 4

Site Type: [dropdown]

Experimental Unit: 1 TREE tree

Study Design: RACOB [dropdown] Randomized Complete

*More intuitive for non-field experiments like orchard or greenhouse studies*

Number of Subsamples

'Tree' experimental unit number for the current experimental unit

Sub	Rep	Blk	Col	Tree	Tit	1	2
1	1	1	1	101	2	100	
1	1	1	2	102	3	100	
1	1	1	3	103	1	0	

Assessment Data Summary Report Options

Report Options | General Summary | Report Preview

☒ Average/Sum subsamples

☒ Include 'Tree' experimental unit number

View | Site Description View | Assessment Data View

View subsamples

By column [dropdown]

Cursor order

By column across 'Tree' [dropdown]

Columns: 1

Use color bands

By 'Tree' experimental unit [dropdown]

Plain lines: 1 Colored lines: 0

Load View Save View

# Editor View

Hide multiple fields at once within a Site Description table

General Trial | Regulations | Objectives/Conclusions | Contacts | Crop Description | Pest Description | Site and Design | Maintenance | Soil | Weather

**Weather Conditions**

Overall Moisture Conditions:  Irrigation Type:

Weather Station Name:  Code:  Distance:

Insert row with Shift+F7, Delete current row with Shift+F8

No.	Date	Time	Moisture	Unit	Min	Max	Avg	Temp	Min % Relative	Max % Relative	Avg % Relative	Min	Max	Avg	Unit	% C
			Total		Temp	Temp	Temp	Unit	Humidity	Humidity	Humidity	Wind	Wind	Wind		Co
1.	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

<

Comment:

Drag to highlight multiple columns/rows, then right-click > “Hide Current Field”

# Quick View toolbar

Automatically filter visible **Pest Description** fields by type  
Simplifies interface to view/enter only pertinent information

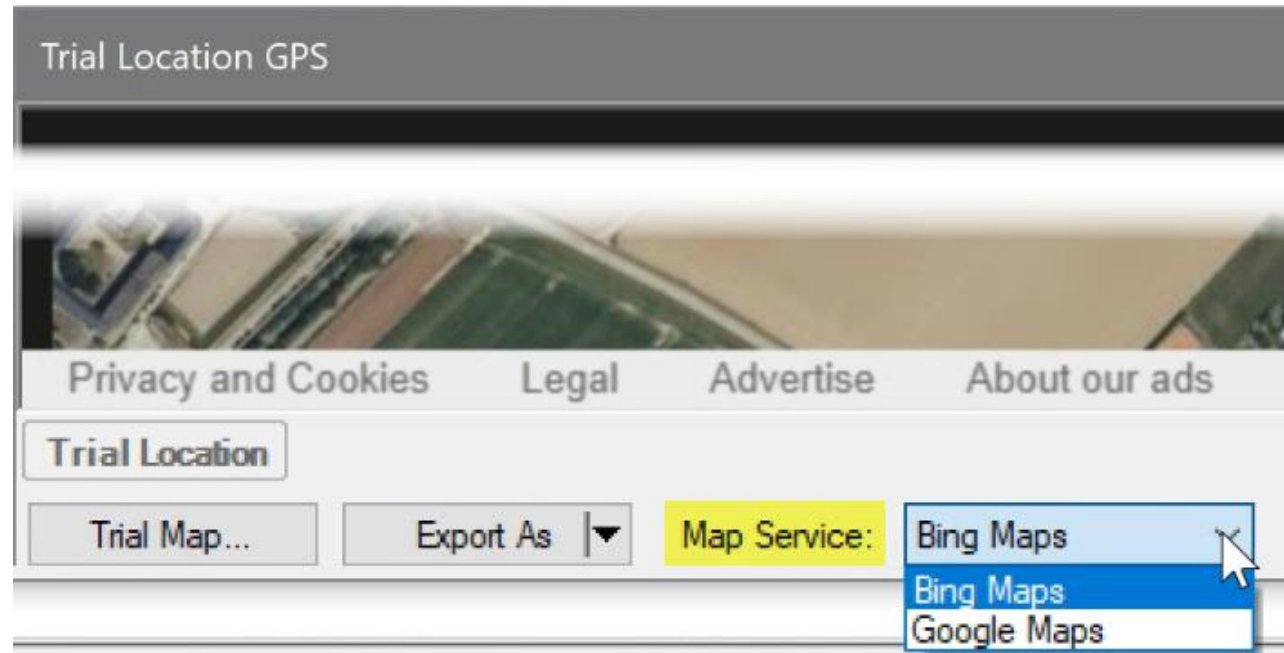
Multi-select to  
view fields from  
multiple types  
at once

The screenshot shows a software interface with a 'Quick View' toolbar and a 'Pest Description' form. The toolbar includes tabs for 'Original', 'Planting', 'Inoc/Infest', and 'Resistance'. The 'Pest Description' form is titled 'Site Description' and contains various input fields for pest information. The 'Inoc/Infest' and 'Resistance' tabs are highlighted in yellow. The form fields include:

- Pest 1 Type: W
- Code: AMAPA
- Common Name: Amaranthus palmeri
- Stage Scale: BBCH
- Artificial Population: [empty]
- Resistance Characteristics: [empty]
- Resistance Information: [empty]
- Establishment Date: [empty]
- Time: [empty]
- Stage at Establishment: [empty]
- Establishment Rate: [empty]
- Concentration: [empty]
- Source: [empty]
- Establishment Method/Description: [empty]
- Storage: [empty]
- Crop: [empty]
- Stage at Infestation: [empty]

# Trial Location GPS

Added the ability to use Google Maps for the Trial Location GPS:

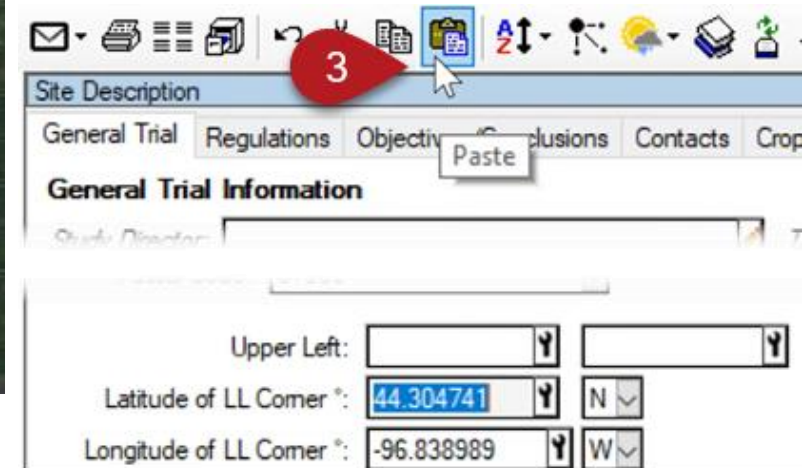
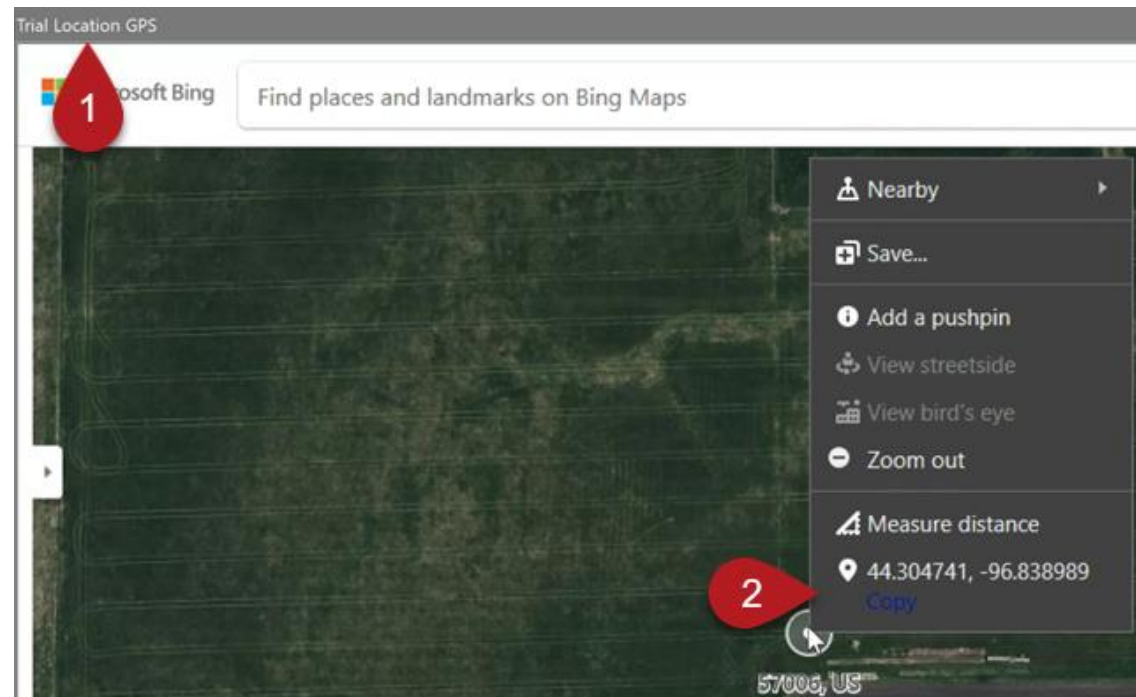


*Google Maps supports only 1 coordinate, so just Lower Left is displayed*

# GPS Coordinates

Paste latitude and longitude at the same time when the copied values are separated by a space, comma and space, or tab

Works with  
Trial Location  
GPS tool:



# New fields in 2024.2

New fields to document Solar Radiation at time of application:

Application Description

NA

	B		
Date	7 May 2023		
Start Time	9:00 AM		
Stop Time	10:00 AM		
Wind Velocity+Dir. Max	17.8	kph	SE
% Cloud Cover	0		
Solar Radiation Start	180.74	W/m2	
Solar Radiation Stop	288.1	W/m2	
Solar Radiation Max	288.1	W/m2	
Moisture 2 Weeks Before Appl	1.3	mm	

*Average amount of high-energy solar radiation that reaches Earth's surface at the trial location*

# Contacts

Added validation list for Organization Type field

**Contacts**

Role: *STYDIR* study director

Study Director: R.E. Cearch Title: Study Leader

Organization: Cearch R Us, Inc. Org. Type: ▼

Org. Type List

Display All ★ Favorites

Org. Type	Description
★ Company	Company
Government Agency	Government Agency
Internal	Internal
Landowner	Landowner
Non-Profit Org	Non-Profit Organization
Private Individual	Private Individual
University	University

# Notes

## Added Notes section to Protocol Description

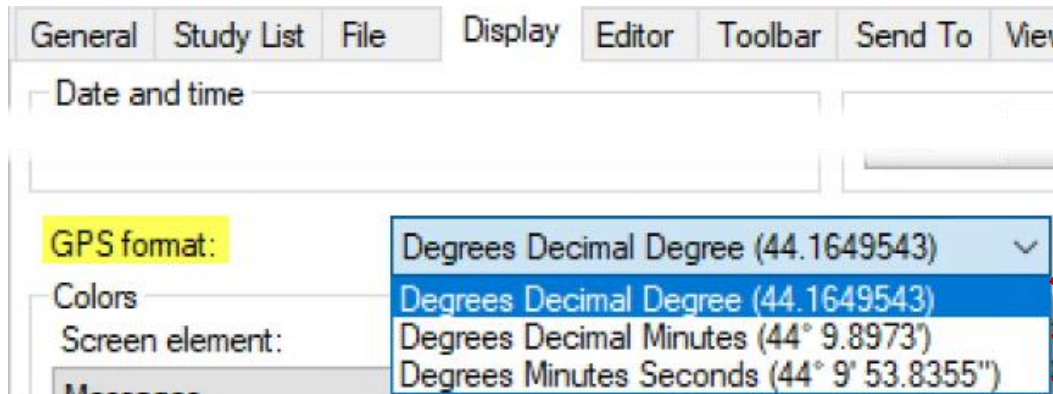
This table is read-only, only for automatic notes like signatures

Protocol Description					
Pest Stage at Appl.	Equipment	Treatment Appl.	Comments	Notes	Site Information
Instructions					
SE Definitions					
<b>Notes</b>					
Insert row with Shift+F7, Delete current row with Shift+F8					
No.	Context	Date	Time	By	Notes
1.	REVIEW	29 May 2024	10:44	First M Name	Automatically added by ARM: Protocol Reviewed
2.	SIGNED	29 May 2024	10:44	First M Name	Automatically added by ARM: Protocol Signed by Contact Your Name; investigator (XSZNAF)

# GPS Coordinates

## Increased precision of alternative GPS display formats

- Show 4 decimal places at the last value (*minutes or seconds*)



Latitude of LL Comer °: 44.3078051 N  
Longitude of LL Comer °: -96.7971542 W

Latitude of LL Comer °: 44°18.4683' N  
Longitude of LL Comer °: -96°47.8293' W

Latitude of LL Comer °: 44°18'28.0984" N  
Longitude of LL Comer °: -96°47'49.7551" W

# Product Amount Calculations

# Product Calculations

Use '1000 Seed Weight' from Crop Description for calculations

1. Link treatment line to crop with Crop ID Number field
2. Fill in 1000 Seed Weight for that crop/variety
3. Calculations can now factor in weight, e.g. Mix Size in kg

Tit Line	Tit No.	Type	Treatment Name	Form Type	Rate	Rate Unit	Appl Code	Appl Timing	Crop ID Number
3	2	SDTR	STD Seed Treatment	CF	0.75	mg AI/Seed	A		1
4	2	VAR	Seed Product 1		35000	Seeds/A	B		1
5	2	INOC	Phytophthora infestans	AL	3.5	Bio En/Row-FT	B		1
6	3	SDTR	SDTR Chem 1	CF	1	mg AI/Seed	A		1
7	3	SDTR	SDTR Chem 2	CF	0.5	mg AI/Seed	A		1
8	3	SDTR	SDTR Chem 3	CF	0.007	mg AI/Seed	A		1
9	3	VAR	Seed Product 1		35000	Seeds/A	B		1

## Crop Description

Crop 1:	<input checked="" type="checkbox"/> ZEAMD	Zea mays indentata	Dent com
Entry Date:		Crop Group:	
Variety:	Reid Yellow Dent		
Seed Lot No:			
% Germination:		% Seed Moisture:	
Seed Shape:	FLAT		
Stage Scale:	BBCH		
Maturity Group:			
Seed Source:			
1000 Seed Weight:	145	g	
Seed Size:			

Reps: 4      Appl Code: A      Plots: 4 by 20 feet  
Slurry Rate: 200 mL/100 kg      Mix Size: 2 kg seed (4 mL vol)

Tit No.	Treatment Type	Treatment Name	Form Conc	Form Unit	Form Type	Rate Rate	Rate Unit	Appl. Amount	Amt Product to Measure
2	SDTR	STD Seed Treatment	30	%	CF	0.75	mg ai/seed	-	34.44 mL/mx
3	SDTR	SDTR Chem 1	500	G/L	CF	1	mg ai/seed	-	27.63 mL/mx
	SDTR	SDTR Chem 2	25	%	CF	0.5	mg ai/seed	-	27.55 mL/mx
	SDTR	SDTR Chem 3	3.5	LB/GAL	CF	0.007	mg ai/seed	-	0.2302 mL/mx
4	SDTR	SDTR Chem 1	500	G/L	CF	2	mg ai/seed	-	55.25 mL/mx

# Product Totals

‘1000 Seed Weight’ now groups Product Amount Totals for variety treatment lines (type=VAR)

- Useful when totaling across trials with different varieties

Product quantities required for listed treatments and applications across multiple studies:

Amount*	Unit	Treatment Name	Form Conc	Form Unit	Form Type	1000 Seed Weight (g)	Lot Code
223.691	g	Seed Product 1				145.0 g	Variety1
60.903	mL	STD Seed Treatment	30	%	CF		
0.280	mL	Phytophthora infestans	10000	No/ML	AL		
403.003	mL	SDTR Chem 1	500	G/L	CF		
194.889	mL	SDTR Chem 2	25	%	CF		
1.628	mL	SDTR Chem 3	3.5	LB/GAL	CF		
291.185	g	Seed Product 1				188.75 g	Variety2

C:\Users\Matt\Documents\ARM Data\G-A117\_SDTR\_Inoc\_24-1.dat

\* 'Per area' calculations based on 4 replicates of 4 by 20 feet 'Plot' experimental units (area of one treatment).

\* 'Per area' calculations based on application amount= 0.0, mix size= 2 kg seed (mix size basis).

C:\Users\Matt\Documents\ARM Data\G-A117\_SDTR\_Inoc\_24-2.dat

\* 'Per area' calculations based on 4 replicates of 4 by 20 feet 'Plot' experimental units (area of one treatment).

\* 'Per area' calculations based on application amount= 0.0, mix size= 2 kg seed (mix size basis).

# Product Amount Totals

- Add up to 2 additional Treatment fields to product totals table
- Used for matching and combining product amounts

Product Amount Totals Report Options

Report Options | Report Preview

Calculation basis: Units reported:

Additional Treatment fields for grouping products

Field 1: Identification Code

Field 2: **None**

None  
Registration Number  
Description  
Identification Code  
Supplier  
Genotype  
Characteristic  
Vendor Name

Product quantities required for listed treatments and applications across multiple studies:

Amount*	Unit	Treatment Name	Form Conc	Form Unit	Form Type	Lot Code
47.700	mL	Tub	250	G/L	EC	



Product quantities required for listed treatments and applications across multiple studies:

Amount*	Unit	Treatment Name	Identification Code	Form Conc	Form Unit	Form Type
15.900	mL	Tub	P1234	250	G/L	EC
31.800	mL	Tub	P9876	250	G/L	EC

# Reports

# Site Description report

Tables that do not fit on a single page wrap directly below the previous table section

Overall Moisture Conditions: SLIWET slightly wet

Weather Conditions

No.	Date	Moisture Total	Unit	Min Temp	Max Temp	Avg Temp	Temp Unit	Min % Relative Humidity	Max % Relative Humidity	Avg % Relative Humidity	Min Wind	Max Wind	Avg Wind	Unit
1.	Jul-1-2024	1.8	mm	15.99	20.27	17.73	C	65	89	76.3	19.1	41.8	28.3	KPH
2.	Jul-2-2024	0.4	mm	16.54	22.96	19.802	C	68	97	83.3	0.4	20.9	11.2	KPH
3.	Jul-3-2024	0	mm	14.93	27.43	21.558	C	44	93	68.2	0	23.4	10.3	KPH
4.	Jul-4-2024	4.4	mm	15.45	21.56	18.55	C	65	92	83	0	31.3	13	KPH
5.	Jul-5-2024	0	mm	14.63	24.21	19.306	C	56	95	77.7	0	28.1	13.4	KPH
6.	Jul-6-2024	8	mm	15.07	26.8	19.583	C	46	95	77.4	0	16.2	7.6	KPH
7.	Jul-7-2024	0	mm	12.92	25.2	19.173	C	48	99	75.3	0	24.5	7.5	KPH
8.	Jul-8-2024	0	mm	13.8	26.76	20.675	C	50	98	72.7	0	11.5	5	KPH
9.	Jul-9-2024	0.5	mm	14.77	27.55	21.981	C	48	96	72.3	0	11.5	4.5	KPH
10.	Jul-10-2024	3.9	mm	16.98	26.77	22.026	C	51	97	75.1	0	23.4	9.1	KPH
11.	Jul-11-2024	0	mm	15.83	27.41	22.185	C	47	97	72	0	22	10.4	KPH
12.	Jul-12-2024	0	mm	17.1	28.9	23.569	C	60	95	76.8	11.5	29.5	19.9	KPH
13.	Jul-13-2024	0	mm	21.57	32.28	26.277	C	60	97	83.5	0.4	24.5	13	KPH
14.	Jul-14-2024	0	mm	20.5	30.62	25.462	C	48	98	73.5	1.1	29.5	8.4	KPH
15.	Jul-15-2024	1.4	mm	18.24	28.81	23.673	C	62	95	79	5.4	24.1	14.5	KPH

No.	Date	% Cloud Cover	Avg Shortwave Radiation	Unit	Avg Soil Temp	Unit	0-10 cm Scaled Soil Moisture	0-200 cm Scaled Soil Moisture	Source
1.	Jul-1-2024	85	134.279	W/m2	18.782	C	0.69	0.87	DTNLLC
2.	Jul-2-2024	59	169.988	W/m2	20.201	C	0.68	0.84	DTNLLC
3.	Jul-3-2024	32	305.16	W/m2	21.388	C	0.64	0.81	DTNLLC
4.	Jul-4-2024	79	177.426	W/m2	20.347	C	0.81	0.81	DTNLLC
5.	Jul-5-2024	42	277.851	W/m2	20.608	C	0.84	0.82	DTNLLC
6.	Jul-6-2024	38	274.686	W/m2	21.563	C	0.82	0.82	DTNLLC
7.	Jul-7-2024	43	255.674	W/m2	20.958	C	0.86	0.84	DTNLLC
8.	Jul-8-2024	7	331.977	W/m2	22.374	C	0.76	0.84	DTNLLC
9.	Jul-9-2024	23	273.558	W/m2	23.22	C	0.7	0.83	DTNLLC
10.	Jul-10-2024	33	293.853	W/m2	23.76	C	0.74	0.84	DTNLLC
11.	Jul-11-2024	1	328.095	W/m2	23.51	C	0.67	0.83	DTNLLC
12.	Jul-12-2024	2	322.876	W/m2	23.9	C	0.61	0.82	DTNLLC
13.	Jul-13-2024	33	238.348	W/m2	25.818	C	0.58	0.82	DTNLLC
14.	Jul-14-2024	28	297.722	W/m2	26.502	C	0.55	0.81	DTNLLC
15.	Jul-15-2024	47	195.618	W/m2	24.671	C	0.59	0.81	DTNLLC

# Borders

## New Global report option for borders of Site Description sections

*No border:*

*Single separator line:*

*Full border:*

Global Report Settings

Global - General | Global - Page Heading | Global - Borders | Global - Page

☒ Print borders

Optional borders

☒ Print border around header

Secondary lines between treatments

Single separator line between Site Description sections

No border around Site Description sections

Single separator line between Site Description sections

Full border around Site Description sections

Treated Plot Width: 2.5 m  
Treated Plot Length: 10 m  
Treated Plot Area: 25.0 m<sup>2</sup>  
Replications: 4  
% Slope: 1.0  
Treatments: 5 Plots: 20  
Study Design: RAOBL Randomized Complete Block (RCB)  
Untreated Arrangement: INCLUDED single control randomized in each block  
Distance between Blocks: 0 m  
Distance between 'Plot' Experimental Units: 0 m

No.	Previous Crop	Year
1.	ZE AMD	2013

### Soil Description

Description Name: That place 1  
% Sand: 23 % OM: 1.3 Texture: CL day loam  
% Silt: 54  
% Clay: 23  
pH: 4.9 Fert. Level: F fair  
CEC: 54

Soil Drainage: F fair

### Application Description

	A	B	C
Date	Apr-15-2014	Jun-3-2014	Jul-8-2014
Start Time	2:30 PM	10:00 AM	11:15 AM
Interval to Prev. Appl.		49 DAYS	35 DAYS
Method	SPRAY	SPRAY	SPRAY
Timing	ATPLAN	POSPOS	POSPOS
Placement	BROSOL	BROFOL	BROFOL
Air Temperature Start, Stop	17, - C	17, - C	19.5, - C
Soil Temperature	10 C	13 C	16 C
Soil Moisture	MOIST	DRY	MOIST
% Cloud Cover	50	20	10

Treated Plot Width: 2.5 m  
Treated Plot Length: 10 m  
Treated Plot Area: 25.0 m<sup>2</sup>  
Replications: 4  
% Slope: 1.0  
Treatments: 5 Plots: 20  
Study Design: RAOBL Randomized Complete Block (RCB)  
Untreated Arrangement: INCLUDED single control randomized in each block  
Distance between Blocks: 0 m  
Distance between 'Plot' Experimental Units: 0 m

No.	Previous Crop	Year
1.	ZE AMD	2013

### Soil Description

Description Name: That place 1  
% Sand: 23 % OM: 1.3 Texture: CL day loam  
% Silt: 54  
% Clay: 23  
pH: 4.9 Fert. Level: F fair  
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Method	SPRAY	SPRAY	SPRAY
Timing	ATPLAN	POSPOS	POSPOS
Placement	BROSOL	BROFOL	BROFOL
Air Temperature Start, Stop	17, - C	17, - C	19.5, - C
Soil Temperature	10 C	13 C	16 C
Soil Moisture	MOIST	DRY	MOIST

Treated Plot Width: 2.5 m  
Treated Plot Length: 10 m  
Treated Plot Area: 25.0 m<sup>2</sup>  
Replications: 4  
% Slope: 1.0  
Treatments: 5 Plots: 20  
Study Design: RAOBL Randomized Complete Block (RCB)  
Untreated Arrangement: INCLUDED single control randomized in each block  
Distance between Blocks: 0 m  
Distance between 'Plot' Experimental Units: 0 m

No.	Previous Crop	Year
1.	ZE AMD	2013

### Soil Description

Description Name: That place 1  
% Sand: 23 % OM: 1.3 Texture: CL clay loam  
% Silt: 54  
% Clay: 23  
pH: 4.9 Fert. Level: F fair  
CEC: 54

Soil Drainage: F fair

### Application Description

	A	B	C
Date	Apr-15-2014	Jun-3-2014	Jul-8-2014
Start Time	2:30 PM	10:00 AM	11:15 AM
Interval to Prev. Appl.		49 DAYS	35 DAYS
Method	SPRAY	SPRAY	SPRAY
Timing	ATPLAN	POSPOS	POSPOS
Placement	BROSOL	BROFOL	BROFOL
Air Temperature Start, Stop	17, - C	17, - C	19.5, - C
Soil Temperature	10 C	13 C	16 C
Soil Moisture	MOIST	DRY	MOIST

# Summary Reports

# Mean Comparison 'na'

Improved reporting of assessments where error variance is 0

- F statistics (AOV) report as 'Not a Number'
- Mean comparisons are 'not applicable'

*Occurs when there is no variation in treatment response (e.g. no pest pressure or crop damage)*

Rating Date	15 Jul 2023	15 Jul 2023	13 May 2023
Part Rated	LE AF, C	PLANT, C	LEAF3, P
Rating Type	PHYGEN	VIGOR	PE SSE V
Rating Unit	%	%	%
Rating Min/Max/Interval	0, 100, -1	0, 100, -1	0, 100, -10
Number of Subsamples	1	1	10
Crop Type, Code	C, TRZAW	C, TRZAW	C, TRZAW
Crop Name	Winter wheat	Winter wheat	Winter wheat
Pest Code			SEPTTR
Pest Name			
Trt-E val Interval	7 DA-C		
Number of Decimals			
Trt Treatment	1*		
No. Name	Rate Unit Code		
1 Untreated Check	ABC	0.0 na	100.0 na
2 Tub	0.5 l/ha ABC	0.0 na	100.0 na
3 Tub	1 l/ha ABC	0.0 na	100.0 na
4 Tilt 250	0.5 l/ha ABC	0.0 na	100.0 na
5 Mico 60	1.5 l/ha AB	0.0 na	100.0 na
Fungol	1.25 l/ha C		
LSD P=.05			
Standard Deviation	0.00		
CV	0.0		
Levene's Prob(F)			0.73
Replicate F	NaN	NaN	0.757
Replicate Prob(F)	NaN	NaN	0.5394
Treatment F	NaN	NaN	8.877
Treatment Prob(F)	NaN	NaN	0.0014

na = not applicable

NaN = not a number

Means followed by same letter or symbol do not significantly differ (P=.05, Student-Newman-Keuls).  
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.  
Could not calculate LSD (% mean diff) or mean separation letters for columns 1,2 because error variance is 0.  
Mean separation letters are 'na' (not applicable) when error variance is 0

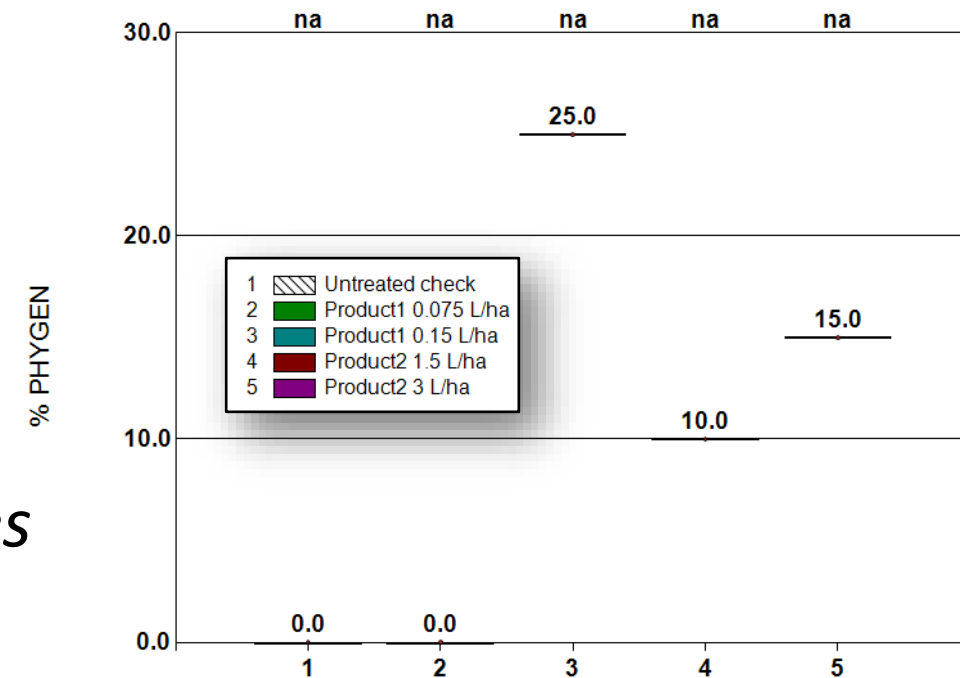
# Mean Comparison 'na'

**Scenario 2:** Differences between treatments, but no differences across replicates (0 variation)

*E.g. visual assessment aggregated across replicates*

Same statistical result: Error Mean Square = 0

Rating Date	Jun-12-2024		
Part Rated	PLANT, C		
Rating Type	PHYGEN		
Rating Unit	%		
Rating Min/Max/Interval	0, 100, -		
Sample Size	1 PLOT		
Crop Type, Code	C, HORVS		
Trt Treatment	Rate	Unit	1
No. Name	Rate	Unit	
1 Untreated check			0.0 na
2 Product1	0.075 l/ha		0.0 na
3 Product1	0.15 l/ha		25.0 na
4 Product2	1.5 l/ha		10.0 na
5 Product2	3 l/ha		15.0 na
LSD P=.05			
Standard Deviation	0.00		
CV	0.0		



*Note: na does **not** mean “no significance”, it means “we cannot calculate statistical significance”*

# Assessment Data Summary

Only print the relevant number of subsamples when fewer columns are included on the report

*Example: (column 3 has 10 subsamples, but is not printed)*

# OLD

Trt	Treatment	Rate	Appl		
No.	Name	Unit	Code	Plot	
1	Untreated Check	ABC	102		
			102	0.0	100.0
			102		
			102		
			102		
			102		
			102		
			102		
			102		
			102		
			205	0.0	100.0
			205		
			205		
			205		
			205		
			205		
			205		
			205		
			303	0.0	100.0
			303		
			303		
			303		
			303		
			303		
			303		
			303		
			303		
			401	0.0	100.0
			401		
			401		
			401		
			401		
			401		
			401		
			401		
			Mean =	0.0	100.0

**NEW**

Trt	Treatment	Rate	Appl		
No.	Name	Rate	Unit	Code	Plot
1	Untreated Check	ABC	102	0.0	100.0
			205	0.0	100.0
			303	0.0	100.0
			401	0.0	100.0
		Mean =		0.0	100.0
2	Tub	0.5 l/ha	ABC	104	0.0
			201	0.0	100.0
			302	0.0	100.0
			403	0.0	100.0
		Mean =		0.0	100.0

# Schedule Tasks

# Schedule Tasks

Now supports **Pest Establishment Date** for Tasks and Interval

**Schedule Tasks**

Type

☒ Treatment application - for Appl Code: A ▼

☐ Assessment - for Rating Timing:  ▼

☐ Other  ▼  ▼

Description: Application occurs 2 weeks after inoculation.

Assigned to: Jenkins, B. ▼

Timing

☐ Date:  ▼

☒ Interval: 14.00 ▼ Days ▼

☒ Completed

17 Mar 2024 ▼

Establishment Date ▼ 1 ▼

**Schedule Tasks**

Type

☐ Treatment application - for Appl Code:  ▼

☐ Assessment - for Rating Timing:  ▼

☒ Other Establishment Date ▼  ▼

Description: Artificial infestation/inoculation of Pest 1

Assigned to:  ▼

Timing

☒ Date:  ▼

☐ Interval:  ▼  ▼

☒ Completed

▼

**Pest List**

Pest	Establishment Date	Code	Pest Name	Attributes
1		PHYTIN	Late blight of potato	

# Schedule Tasks

Application list now includes Method, Timing, and Placement

Adds detail for scheduling applications or tasks relative to applications

*Fixes issue where applications did not display in this list in a protocol*

Timing

☐ Date:

☒ Interval: 2.00   Weeks

☐ Completed

Appl List

Appl	Date	Time	Method	Timing	Placement	Applied By
A	15 Apr 2023	14:30	SPRAY	ATPLAN	BROSOI	
B	3 Jun 2023	10:00	SPRAY	POSPOS	BROFOL	
C	8 Jul 2023	11:15	SPRAY	POSPOS	BROFOL	

(All)  (All)  (All)  (All)  (All)  (All)  (All)

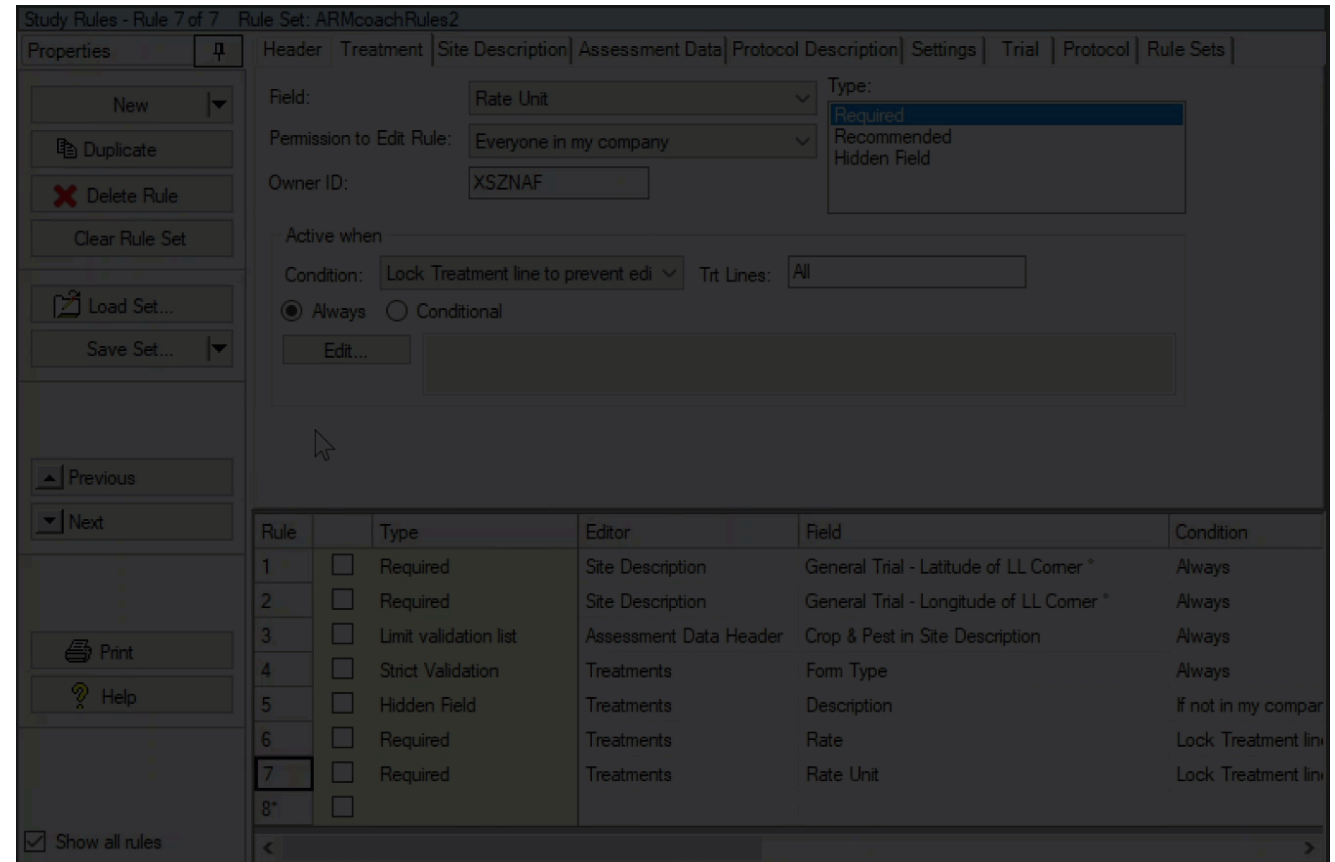
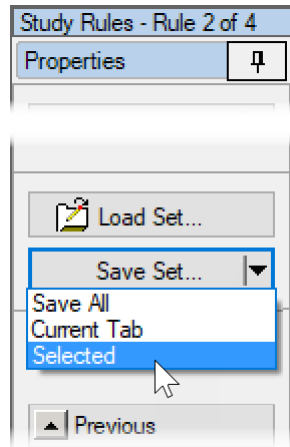
Active Filter

# Study Rules

# Selected rules

Added checkboxes to select a group of rules to perform actions:

- Delete
- Copy/Cut (*use right-click*)
- Save Set




# Attachments

# Attachments Editor

New option to display size of attachment files

Attachments							
Attach No	Name	Type	Modified	Plot	Col	Size (KB)	Description
1	Documents\ARM Data\Tutorial\G-All7_Fung_T0004_Jul-15-2014_P103.jpg	JPEG Image	16 Oct 2014	103	2	9	
2	Documents\ARM Data\Tutorial\G-All7_Fung_T0002_Jul-15-2014_P104.JPG	JPEG Image	9 Jan 2015	104	2	4997	

Preview



☐ Hide attachments that are automatically added by ARM

☒ Show file sizes

Attach

Open

Print

Remove

Preview

Help

*Files can be changed outside of ARM, so this is a toggle to turn on or off*

# Study List

# Study List

Added new fields to the Study List:

- Trial Origin, SE Definitions – SE Name, Assessment Data – SE Name

*Tip: Use both SE Name filters to find trials that did not use a particular SE:*

The screenshot shows the 'Study List' application window. On the left is a tree view with categories: Site and Design, Soil/Moisture, Application, SE Definitions, Assessment Data (highlighted), and Other. A red callout '1' points to the 'Assessment Data' category. The main panel has a red header 'Select study to open - Active Filter (1/24):'. It contains two filter sections: 'SE Definitions' with an 'SE Name' field set to 'D011', and 'Assessment Data' with an 'SE Name' field set to '^D011'. Below these are 'Part Rated' options (Include, Exclude) and a 'Range' field. A red callout '2' points to a dropdown menu showing '(All)', '(Blank)', and 'D011' (which is selected with a checkmark). A red callout '3' points to the 'Exclude' button. At the bottom is a table with columns: Selected, Study ID, Parent Project, Project ID, Clinical Trial ID, Other Trial ID, Study Type, Discipline, Status, and Trial F. The first row shows a study with ID 'Fung-noSE', Parent Project 'G-All7\_Fung', Project ID 'B2007RTJ02N25', Study Type 'Trial', Discipline 'F', Status 'F', and Trial F 'HIGH'.

Selected	Study ID	Parent Project	Project ID	Clinical Trial ID	Other Trial ID	Study Type	Discipline	Status	Trial F
<input type="checkbox"/>	Fung-noSE	G-All7_Fung	B2007RTJ02N25			Trial	F	F	HIGH

# Bug Fixes

# Impactful fixes

Fixed issue where box-whisker graph outliers may be beyond the Y-axis range, when the Y axis scale is set to Zero Origin.

Improved messaging when an image is corrupt or too large to add to the Profile or to sign a trial.

Fixed so trial columns that have a blank ARM Action Code are not forced into separate grand mean columns in ARM ST (Summary across Trials) add-in.

Changed so incompatible filename characters are not allowed in Protocol ID and Trial ID fields. These include:

\ / : \* ? < > | # % & \$ ! ' @ + ` =