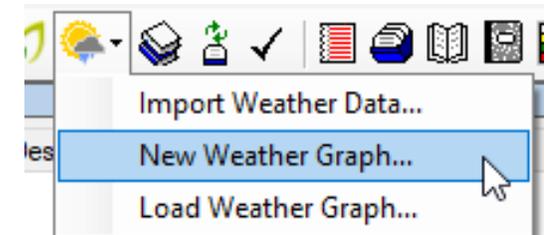


# ARM 2020.x Changes

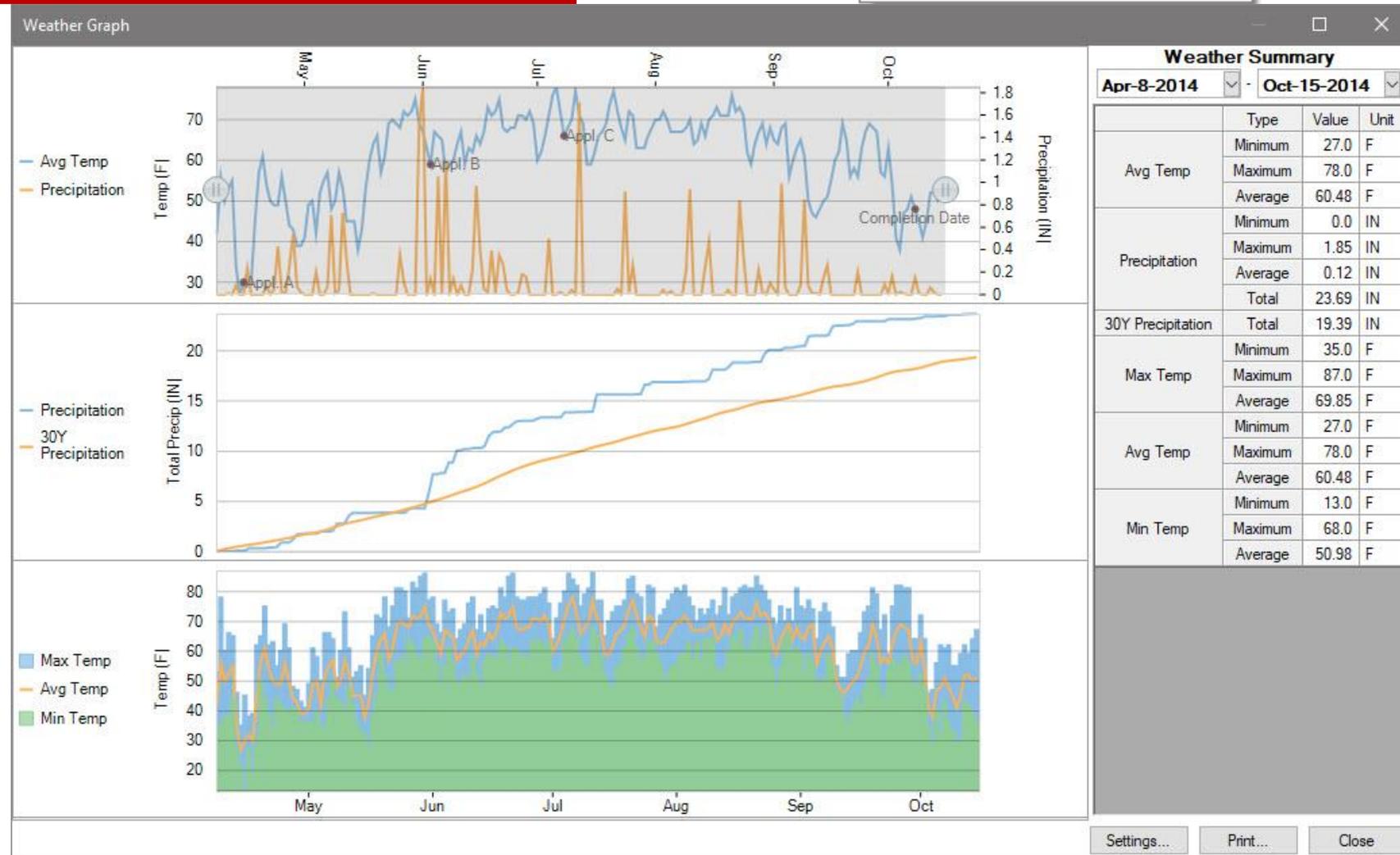
## Key Features

# Weather Graphing

# Graph Weather Data



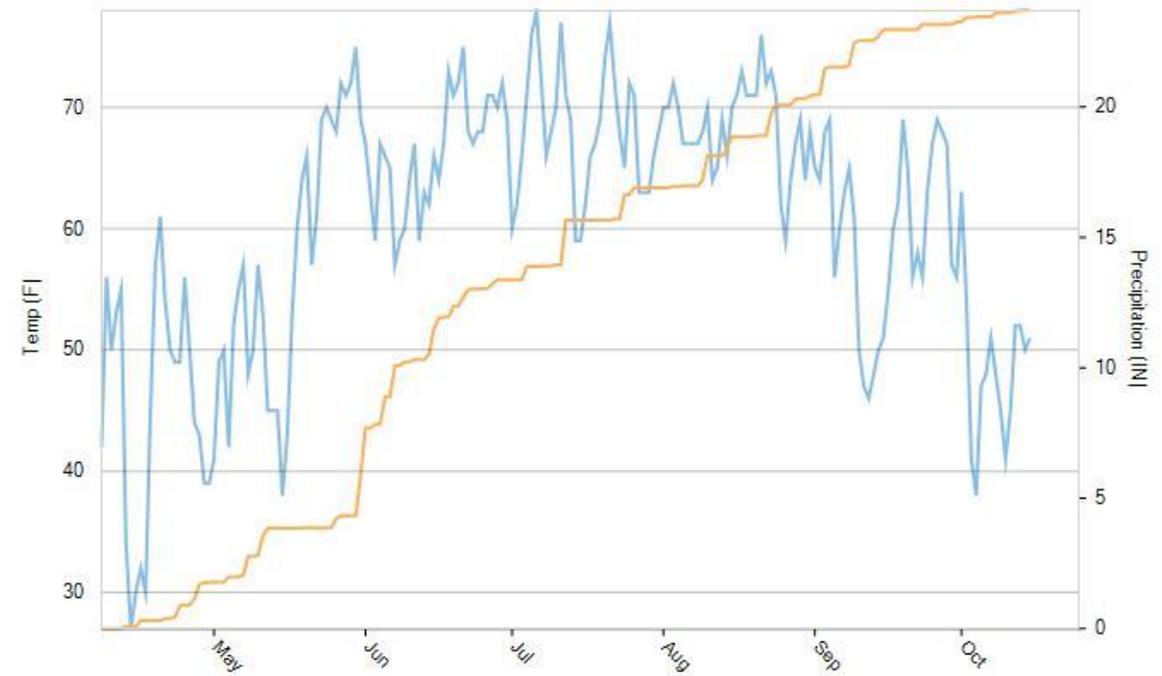
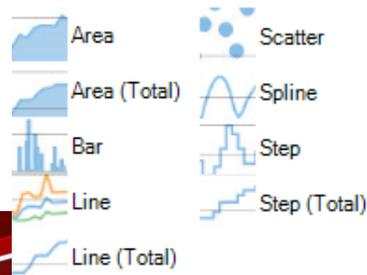
- Visualize daily weather in trial
- Plot up to 3 data fields per graph
- Summarize data in date range



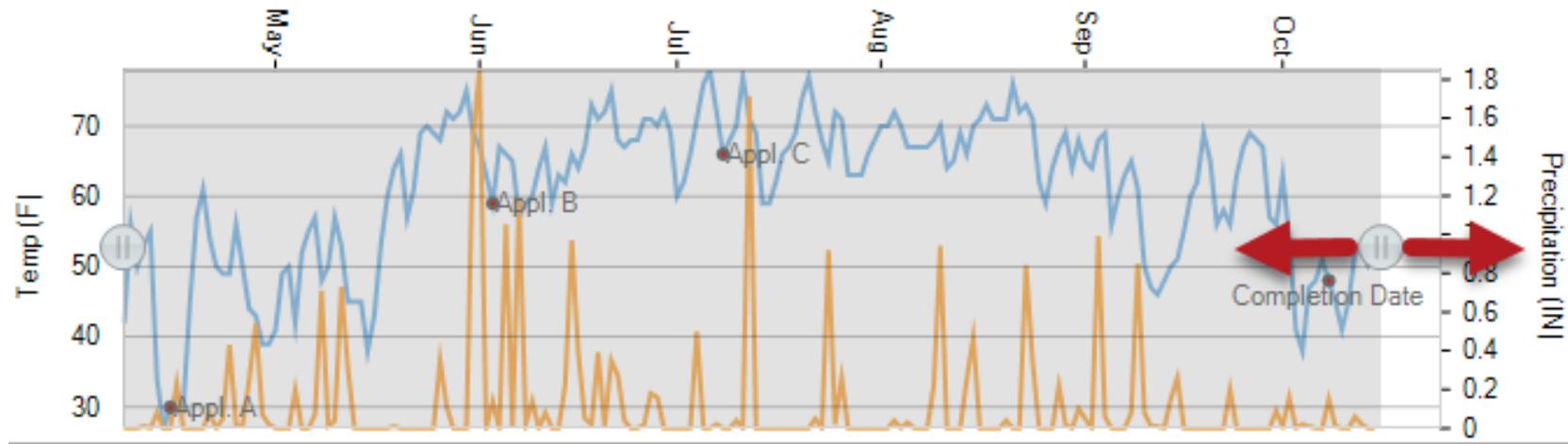
# Graph Weather Data

- Plot up to 3 columns of weather data per graph
- Use left and right Y-axis for mixed units
- Plot cumulative data or individual values
- Multiple graph types

	Data Series 1	Data Series 2	Data Series 3
Field:	Avg Temp	Precipitation	None
Type:	Line	Line (Total)	
Y Axis:	<input checked="" type="radio"/> Left <input type="radio"/> Right	<input type="radio"/> Left <input checked="" type="radio"/> Right	<input checked="" type="radio"/> Left <input type="radio"/> Right
Left Y Axis Label:	Temp		Right Y Axis Label: Precipitation



# Graph Weather Data



**Weather Summary**

Apr-8-2014  - Oct-15-2014

	Type	Value	Unit
Avg Temp	Minimum	27.0	F
	Maximum	78.0	F
	Average	60.48	F
Precipitation	Minimum	0.0	IN
	Maximum	1.85	IN
	Average	0.12	IN
30Y Precipitation	Total	23.69	IN
Max Temp	Minimum	35.0	F
	Maximum	87.0	F
	Average	69.85	F
Avg Temp	Minimum	27.0	F
	Maximum	78.0	F
	Average	60.48	F
Min Temp	Minimum	13.0	F
	Maximum	68.0	F
	Average	50.98	F

- Select a custom date range to plot, using the interactive slider
- Summarize plotted data within chosen date range (Min, Max, Avg)

# Column Diagnostics

# Spatial Analysis

- New ARM Action Codes apply a **spatial model** to individual column
  - Trend analysis – analyze effects across whole field
  - Nearest neighbor – analyze effects only in space adjacent to individual plots
- Adjusts mean estimates to attempt to recover unexplained error in a field
- Use when blocking design fails

ARM Action Codes Personal List	
ARM Action Codes	Description 1
*****	*** Following Identify Spatial Models ***
LST	Linear spatial trend
QST	Quadratic spatial trend
CST	Cubic spatial trend
NRN	Nearest row neighbor
NCN	Nearest column neighbor
NRCN	Nearest row and column neighbor (Papadakis)
NRNC	Nearest row neighbor and column neighbor

# Column Diagnostics

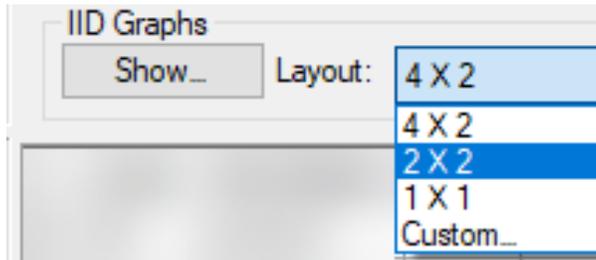
- Determine which spatial model to use with new descriptive statistics and recommendations

Diagnostics					
<input checked="" type="checkbox"/> Include spatial models					
Raw Graphs					
Show... Layout: 4 X 2					
Statistics (P)	Raw <input checked="" type="checkbox"/>	IID <input type="checkbox"/>	LST <input type="checkbox"/>	QST <input type="checkbox"/>	NCN <input type="checkbox"/>
MaxStdRes	.	2.37	2.613	2.092	2.908
logLik	.	-70.946	-71.664	-70.548	-73.842
ModelDF	.	7	6	9	5
ResDF	.	12	13	10	14
AIC	.	159.892	159.327	163.096	161.684
BIC	.	168.854	167.293	174.049	168.655
MoranI	-0.295	-0.323	-0.251	-0.436	0.022
Tukey1DF	.	0.0	.	.	.

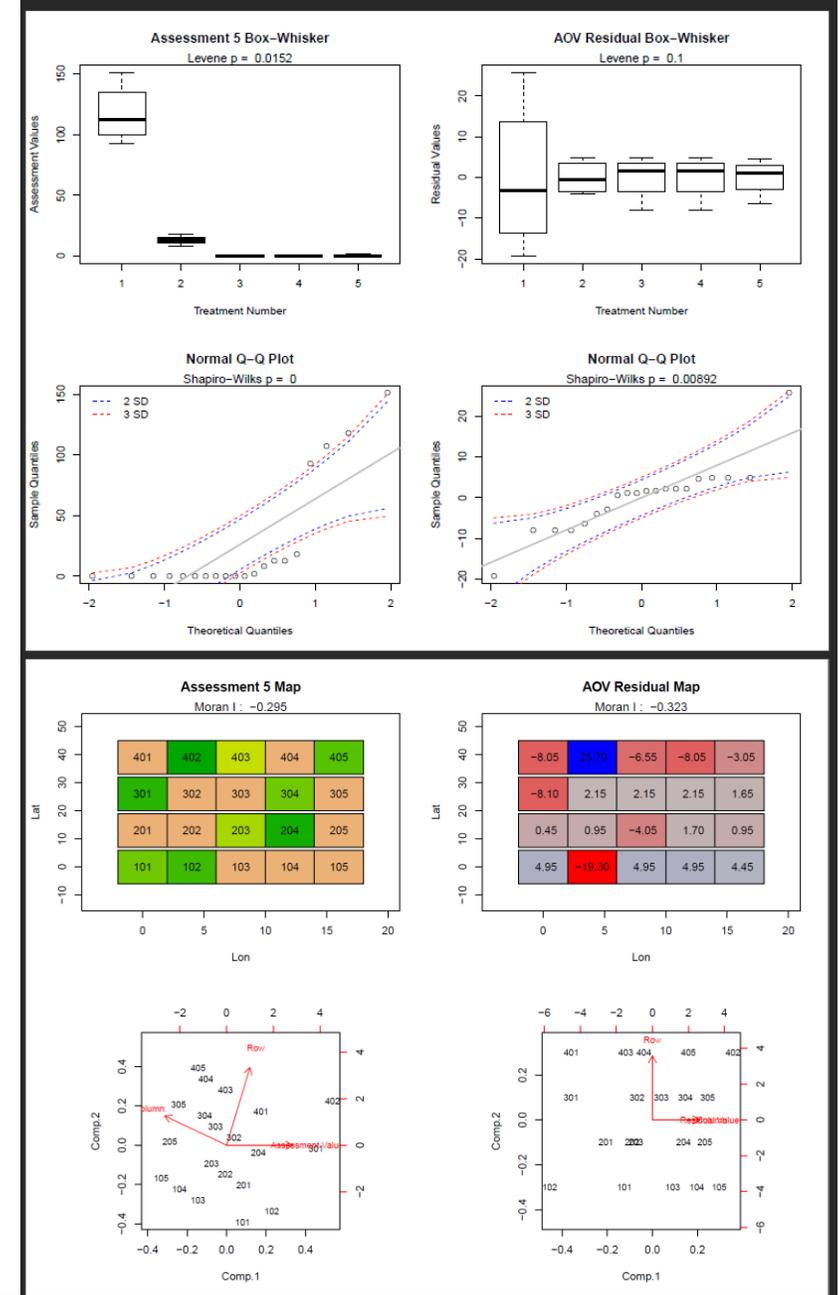
Recommendations				
Basis	Assessment Values			
	Code	Test Statistic	Value	
1	IID	Levene's	2.361	Does not fail test of homogeneity of variances among treatments
2	AR	ShapiroWilks	0.863	Available transformations do not improve normality
3	IID	Skewness	1.383	Does not fail test of skewness of residuals
4	AS	Kurtosis	3.953	Select action code to reduce kurtosis of residuals
5	LST	AIC	0.565	Spatial model improves AIC over design model
6	LST	BIC	1.561	Spatial model improves BIC over design model

# Column Diagnostics

- Change the number of diagnostic graphs per page, to improve readability



- Two new graphs for spatial models
  - Residuals heat map and spatial bi-plot



# Site Description

# Copy Application Column

- Duplicate application details that are common to other application codes

Copy Application Column ×

**Copied Column**

	A		
Application Date	15 May 2020		
Appl. Start Time	10:00 AM		
Application Method	SPRAY		
Application Timing	DISONS		
Application Placement	FOLIAR		
Air Temperature Start, Stop	52	F	
Wind Velocity+Dir. Start	5	MPH	N
Wet Leaves (Y/N)	N		
% Cloud Cover	50		

Copy linked sections

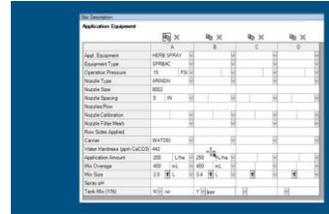
- Crop Stage at Appl.
- Pest Stage at Appl.
- Appl. Equipment

**Select destination column(s) for paste**

<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
15 May 2020		
10:00 AM		
SPRAY		
DISONS		
FOLIAR		
52 F		
5 MPH N		
N		
50		

# Copy Application Column

Feature in Action:



- Paste information to empty fields of selected Application Codes
- Perform action on other application-related tabs at the same time

Copy Application Column

**Copied Column**

	A
Appl. Equipment	HERB SPRAY
Equipment Type	SPRBAC
Operation Pressure	15 PSI
Nozzle Type	ARINDH
Nozzle Size	8002
Nozzle Spacing	8 IN
Carrier	WATDEI
Water Hardness (ppm CaCO3)	442
Application Amount	200 L/ha
Mix Overage	400 mL
Mix Size	2.8 L
Tank Mix (Y/N)	N

Copy linked sections  
 Crop Stage at Appl.  
 Pest Stage at Appl.  
 Application

**Select destination column(s) for paste**

<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> C	<input type="checkbox"/> D
HERB SPRAY	HERB SPRAY	
SPRBAC	SPRBAC	
15 PSI	15 PSI	
ARINDH	ARINDH	
8002	8002	
8 IN	8 IN	
WATDEI	WATDEI	
442	442	
250 L/ha	200 L/ha	
400 mL	400 mL	
3.4 L	2.8 L	
Y	N	

Select All Clear All

OK Cancel

# Delete button

Feature in Action:

No.	Date	Time	Moisture Total	Unit	Min Temp	Max Temp	Avg Temp	Temp Unit	% Relative Humidity
1	9 Nov 2017		0.24	IN	52.9	59.9	56.437	F	99.3
2	10 Nov 2017		0.01	IN	35	58.4	50.089	F	73.8
3	11 Nov 2017		0	IN	29.9	45.8	37.155	F	64.8
4	12 Nov 2017		0	IN	32.5	58	46.028	F	79
5	13 Nov 2017		0.39	IN	42.3	50.8	47.341	F	96.5
6	14 Nov 2017		0.01	IN	40.5	54.3	46.973	F	85.5
7	15 Nov 2017		0	IN	37.7	57.2	46.864	F	90
8	16 Nov 2017		0	IN	43.6	65.5	53.178	F	77.6
9	17 Nov 2017		0	IN	31.6	54.7	42.944	F	76.8
10	18 Nov 2017		0	IN	29.4	65.8	50.801	F	81.9
11	19 Nov 2017		0.13	IN	40.9	65.7	56.974	F	63
12	20 Nov 2017		0	IN	32.9	55.4	41.255	F	70.7
13	21 Nov 2017		0	IN	30	63.5	47.302	F	83.9
14	22 Nov 2017		0.02	IN	42.7	64	56.245	F	92.4

## New delete button for repeating sections

Collapsible panels

Grids

Site Description

**Pest Description**

- Pest 1 Type:  Code:    
Common Name:   
Attributes:   
Establishment Date:

- Pest 2 Type:  Code:    
Common Name:   
Attributes:   
Establishment Date:

Weather Application Crop Stage at Appl. Pest Stage at Appl

No.	Date	Time	Moisture Total	Unit	Min Temp
2	10 Nov 2017		0.01	IN	35
3	11 Nov 2017		0	IN	29.9
4	12 Nov 2017		0	IN	32.5

# Settings-Linked Fields

- Edit numeric fields linked to Settings directly in the Site Description
- Previously the Settings dialog displayed instead

Before:

After:

Site Description

General Trial | Objectives/Conclusions | Contacts | Crop Description | Pest Description | Site and Design | Mainte

**Site and Design**  
Some information is copied from General and Design tab of Settings - make changes there

Treated Plot Width: 5 m  
Treated Plot Length: 10 m  
Treated Plot Area: 50 m<sup>2</sup>  
Replications: 4  
% Slope: 1.0

Treatments: 5

Site Type: FIELD field  
Experimental Unit: 1 PLOT plot  
Tillage Type:   
Study Design: RACOBL Randomized Compl

Site Description

General Trial | Objectives/Conclusions | Contacts | Crop Description | Pest Description | Site and Design | Mainte

**Site and Design**

Treated Plot Width: 5 m  
Treated Plot Length: 10 m  
Treated Plot Area: 50 m<sup>2</sup>  
Replications: 4  
% Slope: 1.0

Treatments: 5

Site Type: FIELD field  
Experimental Unit: 1 PLOT plot  
Tillage Type:   
Study Design: RACOBL Randomized

# Contacts

- Added new repeating section
- Include contacts with different roles
- Contacts tab also on Protocol Description

Site Description

Contacts

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

-	Role:	CONTRB	contributor		
☰	Contact Name 5:	Matt Elsinger			
✖	Organization:	GDM Solutions			
	Address 1:	123 Elm St		Phone No.:	123-456-7890
	Country:	USA	United States	E-mail:	
	City:	Brookings		State/Prov:	SD

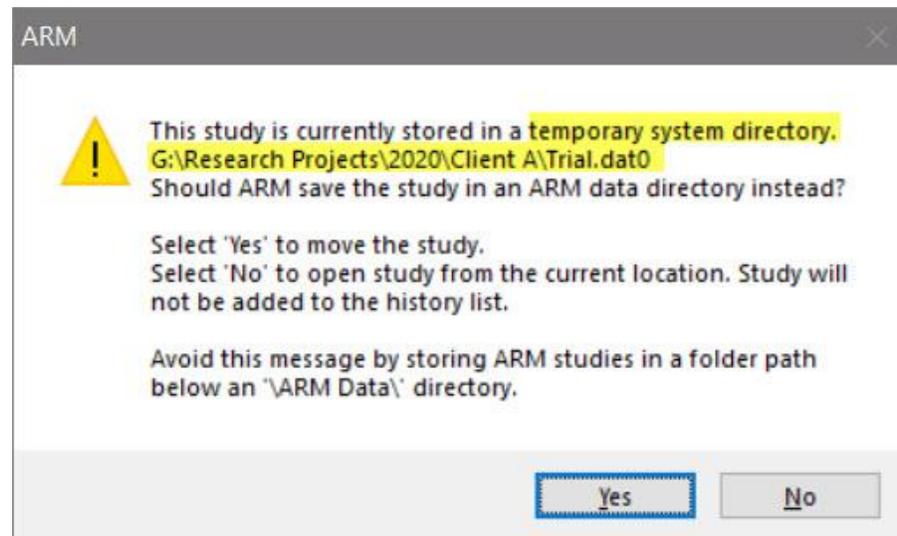
  

-	Role:	DATMGR	data manager		
☰	Contact Name 6:	Kyle Kepner			
✖	Organization:	GDM Solutions			
	Address 1:	456 Birch Ave		Phone No.:	987-654-3210
	Country:	USA	United States	E-mail:	
	City:	Brookings		State/Prov:	SD

# Open Study

# Open Study

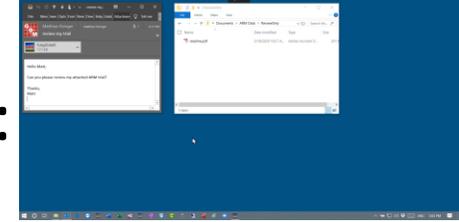
- Prompt about "temporary system directory" will NOT appear except when necessary.



- Previously would appear when opening study from an 'unknown' folder

# Open Study

Feature in Action:



- Review files by saving them in folder named **ReviewOnly**

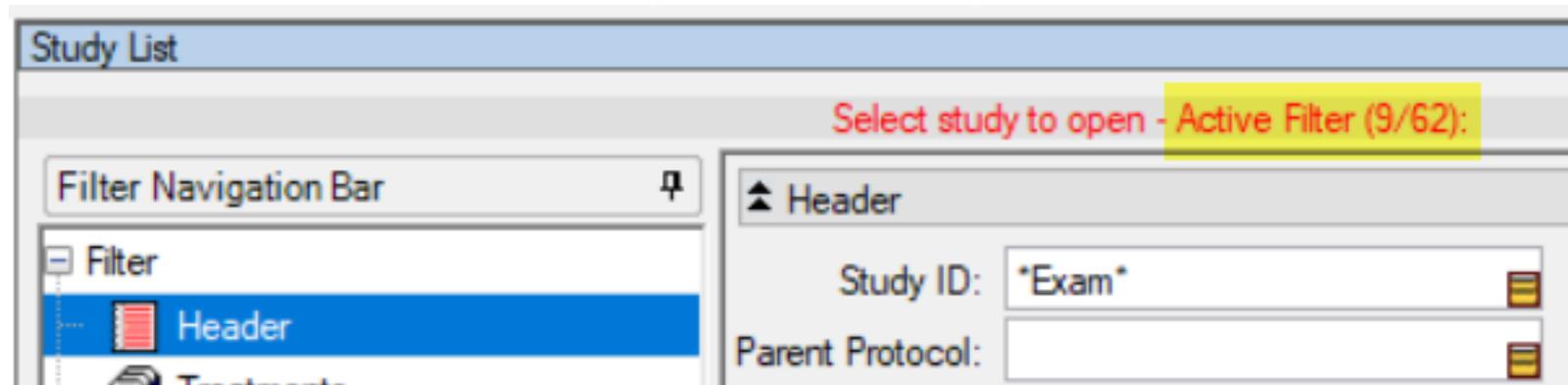
Name	Date modified	Type
 Fung20.dat0	3/23/2020 1:39 PM	ARM Trial



- A study opened from this folder:
  - Opens as read-only
  - Is not added to the study list
  - Is not compared for duplicates

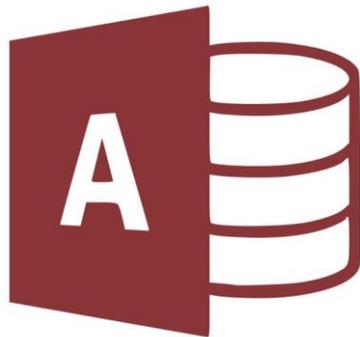
# Study List

- Added 'Active Filter' to top of dialog
- Displays when there a filter defined



# Behind the scenes

- Upgraded database engine from Access to SQLite
  - ARM no longer impacted by 64-bit Office, updates
  - Study List rebuild is now faster



- *Note: this one-time update will require admin rights to install with 2020.2*

# ARM Editors

# Validation List

- Filter to see only blank entries in a validation list column

The screenshot shows a software interface with a table and a filter menu. The table has columns for 'Form Type', 'Term', 'Form State', 'Undiluted', 'Obsolete', and 'Definition'. A filter menu is open over the 'Form Type' column, showing options: 'Filter by (Blank)', 'Filter For ...', 'Remove Filter', and 'Auto-Size Column Widths'. The 'Form Type' column in the table above the filter menu shows 'EC' with a dropdown arrow.

Trt Line	Form Type
1	
2	EC

Form Type	Term	Form State	Undiluted	Obsolete	Definition
					A liquid, homogeneous
					A solid, heterogeneous

# Validation

- Validate Minimum, Maximum, and Average values:
  - Min is not larger than Max
  - Avg is between Min and Max
- Examples:
  - Weather tab, Assessment editor, Crop/Pest Stage at Appl tab

Min Temp	Max Temp	Avg Temp	Temp Unit
72	70	65	F

Trial Validation Messages

Validation Messages

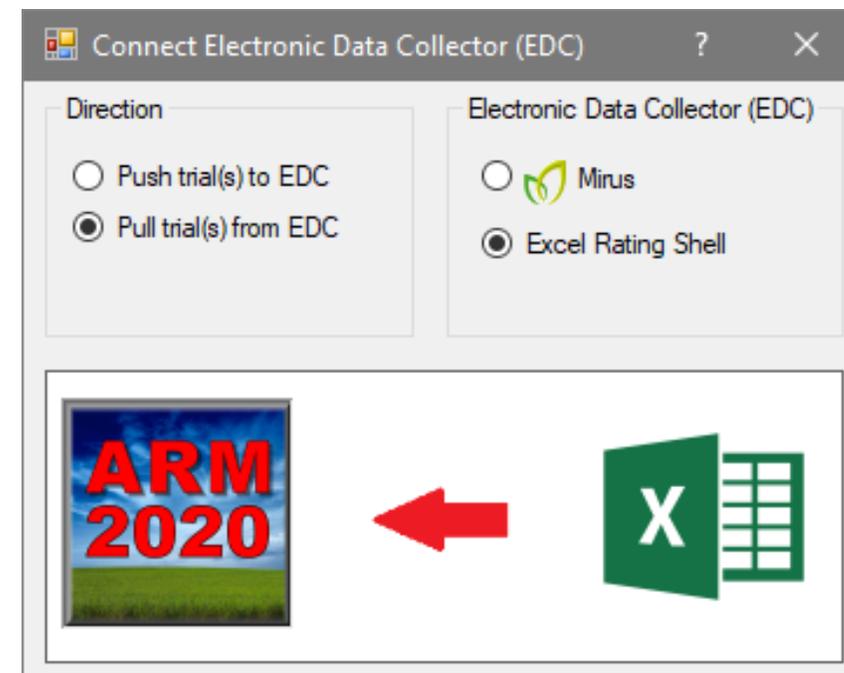
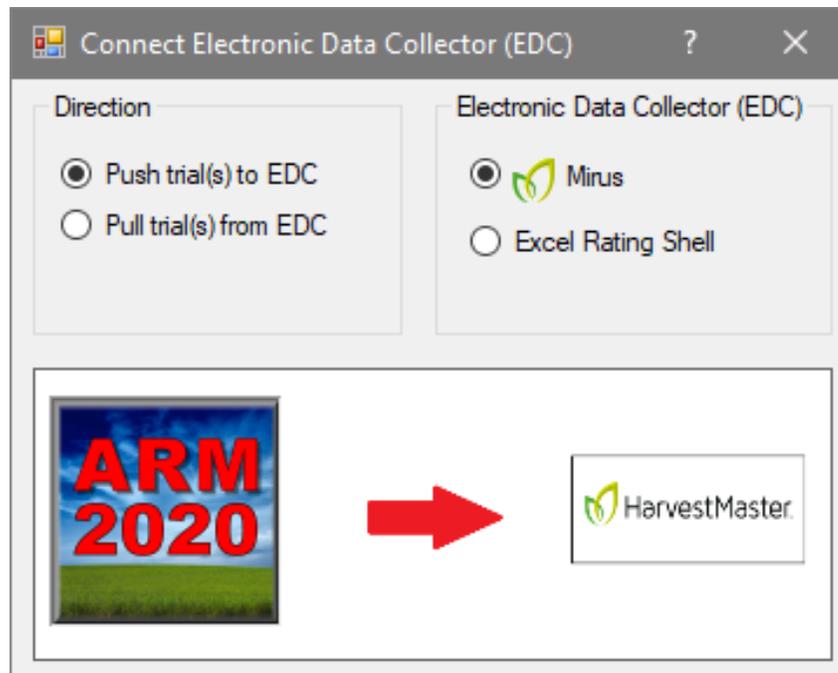
- Errors
  - Entry in Min Temp (72) cannot be larger than Max Temp (70).
  - Entry in Avg Temp (65) cannot be smaller than Min Temp (72).

# Mirus/Rating Shell

New toolbar icon: 

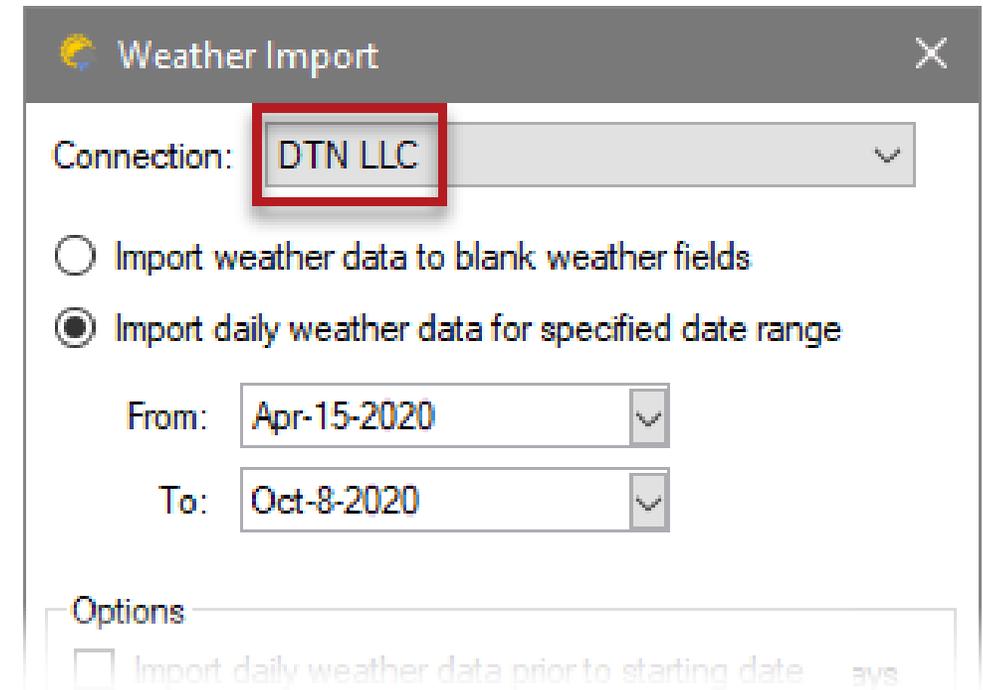
Data collection connections are now accessed through new wizard:

## Connect Electronic Data Collector (EDC)



# Import Weather

- Iteris ClearAg weather connection renamed to **DTN LLC**
- No change in functionality!



The screenshot shows a 'Weather Import' dialog box with the following settings:

- Connection: DTN LLC (highlighted with a red box)
- Import weather data to blank weather fields (unselected)
- Import daily weather data for specified date range (selected)
- From: Apr-15-2020
- To: Oct-8-2020
- Options: Import daily weather data prior to starting date (days) (unchecked)

# Assessment Images

- Remove multiple assessment images at one time

	Sub	Rep	Blk	Col	Plot	Tit	1	2
🔒	1	1	1	1	101	2	70	84
📄	1	1	1	2	102	4	0	0
	1	1	1	3	103	1	47	70
	1	1	1	4	104	3	55	65
	1	2	2	1	201	3	68	62
	1	2	2	2	202	1	49	74
	1	2	2	3	203	2	68	75
	1	2	2	4	204	4	0	0
	1	3	3	1	301	4	0	0
	1	3	3	2	302	2	71	81
	1	3	3	3	303	3	52	63
	1	3	3	4	304	1	65	60
	1	4	4	1	401	2	64	73
	1	4	4	2	402	4	0	0
	1	4	4	3	403	1	63	63

Assessment Map

Merge from Study...

Assessment (Plot 101, Col 1)

Comment:

Barcode:

GPS:

Damaged

Image:

Attach

Remove

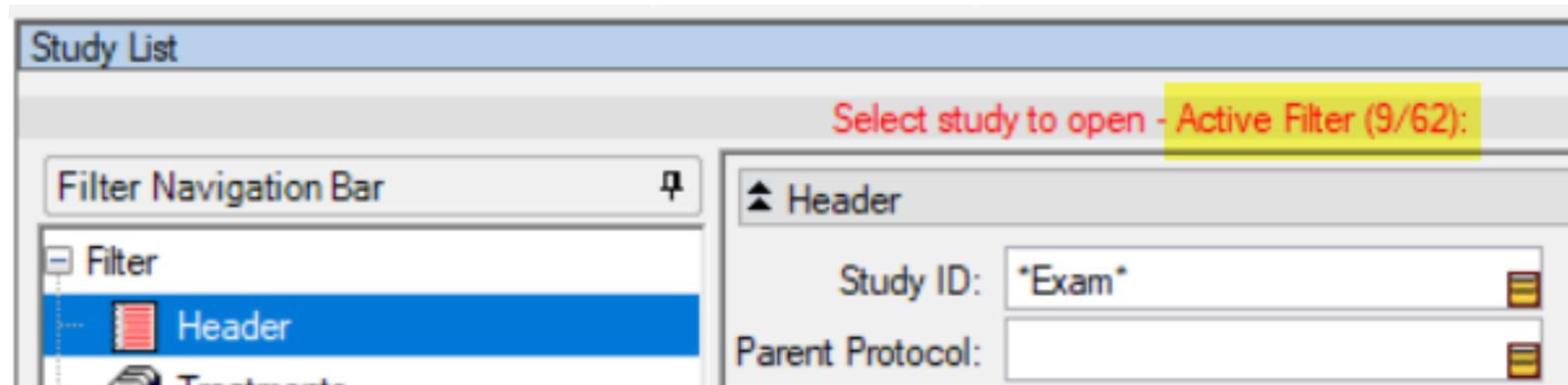
Rename

Display by treatment



# Study List

- Added 'Active Filter' to top of dialog
- Displays when there a filter defined



# Validation List

- Filter to see only blank entries in a validation list column

The screenshot shows a software interface with a table and a context menu. The table has columns for 'Form Type', 'Term', 'Form State', 'Undiluted', 'Obsolete', and 'Definition'. A context menu is open over the 'Form Type' column, showing options: 'Filter by (Blank)', 'Filter For ...', 'Remove Filter', and 'Auto-Size Column Widths'. The 'Form Type' column header has a dropdown arrow and the text 'EC' is visible below it. The table rows are numbered 1 through 11. A window titled 'Form Type Master List (SART)' is also visible in the background.

Trt Line	Form Type	Term	Form State	Undiluted	Obsolete	Definition
1						
2	EC					
3	Form Type Master List (SART)					
4						
5						
6						A liquid, homogeneous
7						
8						
9						
10						
11						A fluid, heterogeneous

# Treatment Type

- New Treatment Type - SBSTR
- Substrate: surface or material, such as type of potting soil

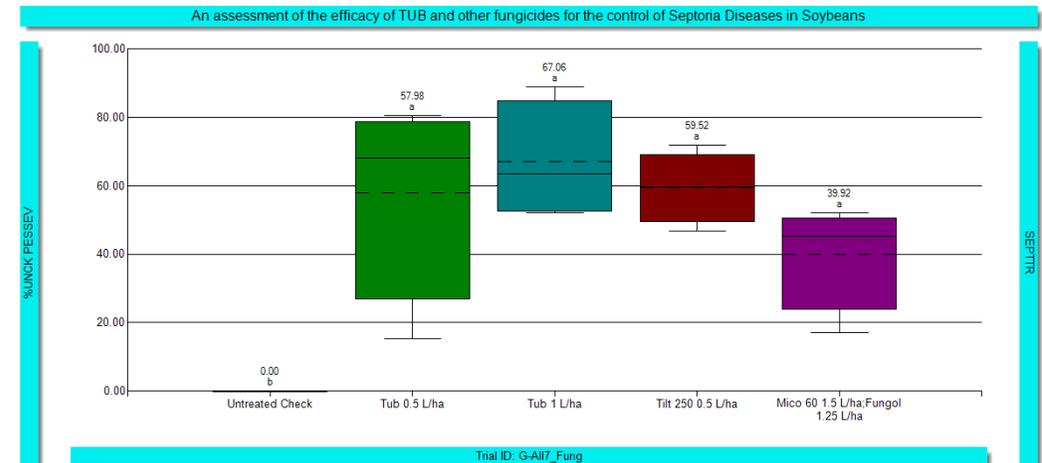
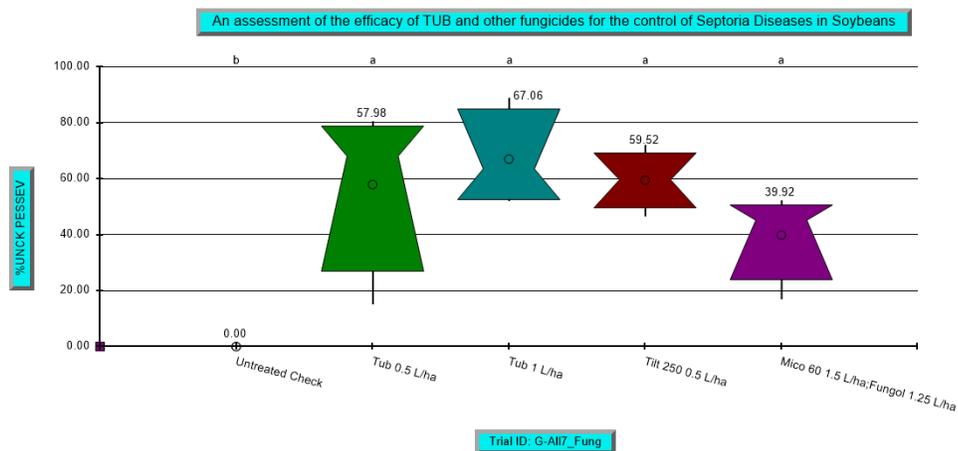
Trt Line	Trt No.	Type	Treatment Name
1	1	SBSTR	

Treatment Name Personal List		
Treatment Name	Form Conc	F
Coarse Sand		
Coir Chip		
Coir Peat		
Greenwaste		
Humate		
Pine Compost		
Sawdust		

# Graph

- Updated graph control to use new graphing utility
- Same functionality remains
- More modern feel, possibilities for enhancements in future



# Study Rules

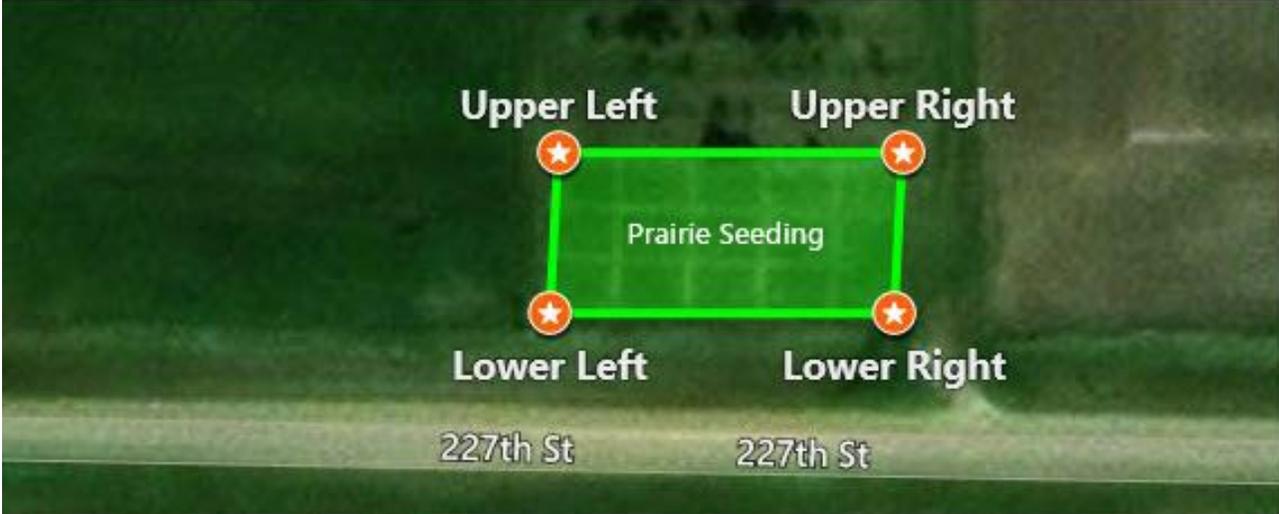
# Review GPS

Study Rules - Rule 1 of 2

Rule	Rule ID	Editor	Field	Condition
1	Review	Site Description	Trial Location GPS	Anyone

- New study rule
- Require confirmation of GPS coordinates
- Display Trial Location GPS dialog to visualize and confirm coordinates

Trial Location GPS



Upper Left Upper Right  
Prairie Seeding  
Lower Left Lower Right  
227th St 227th St

Study rule 1 requires that GPS coordinates must be reviewed and confirmed in order for this trial to pass validation.  
Select 'Confirm' if the entered GPS coordinates are in the correct location on the map.

Trial Location

City:  Country:  *United States*

State/Prov.:

Upper Left:   Upper Right:

Latitude of LL Corner °:   Lower Right:

Longitude of LL Corner °:

# Review Rules

Study Rules				
Rule	Rule ID	Editor	Field	Condition
1	Review	Study Rules	Study Rules	If not in my company

- New study rule
- Require confirmation of study rules upon opening trial
- Trial opens as read-only if rules are not accepted

Review Study Rules ✕

Study rules are active in this trial, and the trial creator has required that rules must be reviewed and accepted before the trial is editable.

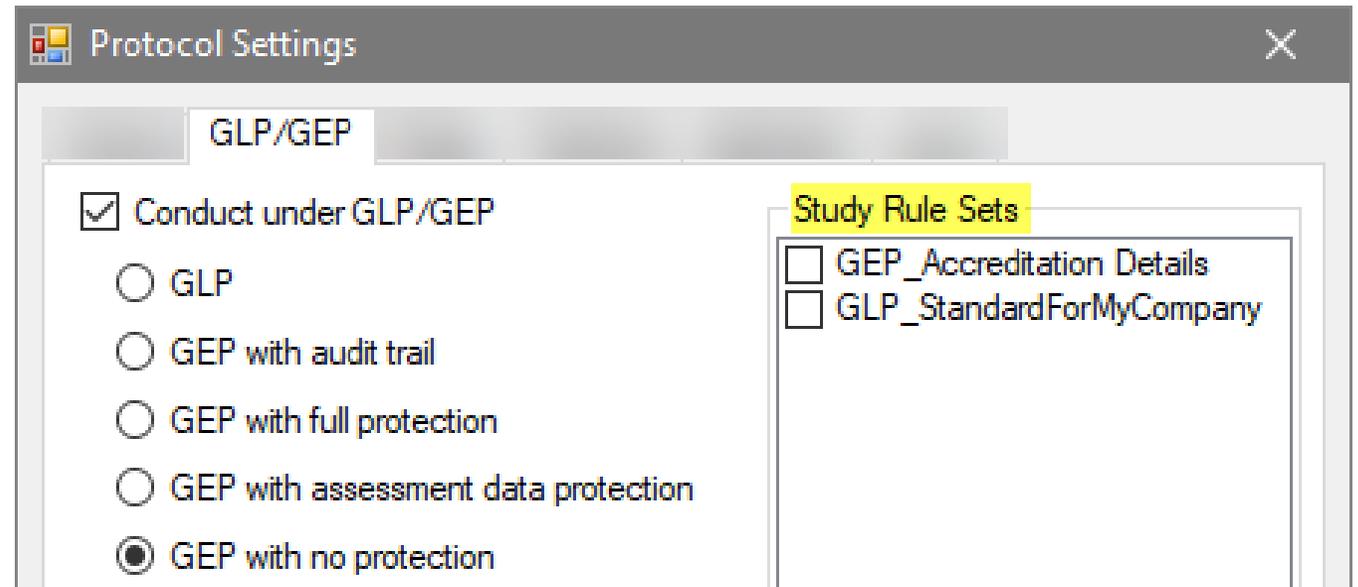
Select 'Accept' once study rules have been reviewed.

Study Rules - Rule 1 of 2

Rule	Rule ID	Editor	Field	Condition	Columns/Trt Lines
1	Review	Study Rules	Study Rules	If not in my company	
2	Limit validation list	Assessment Data Header	Crop & Pest in Site Description	Always	

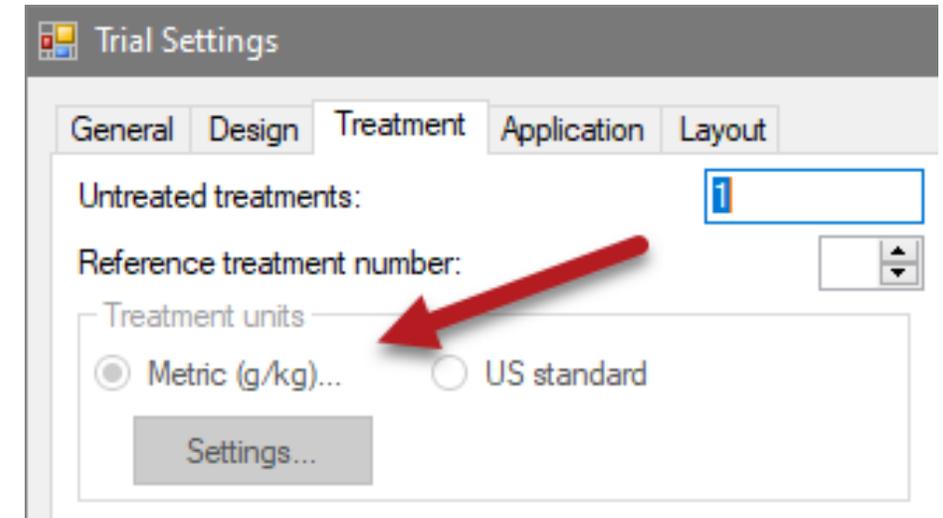
# GLP/GEP Rule Sets

- New option to load GEP/GLP rule sets in new protocol
- Lists all rule sets on PC where name starts with "GEP\_" or "GLP\_"
- Tip: Turn on GLP/GEP from Settings > General



# Lock Settings values

- New rule locks Settings options to prevent edits
  - Treatment Units
  - Study Design
  - Number of Replicates
  - Non-randomized Replicate
  - Treatment Adjacency



Rule	Rule ID	Editor	Field	Condition
1	Required	Settings	Treatment units	Lock to prevent edits
2*			Treatment units Replications Design Non-randomized replicate Treatment adjacency	

Tip: Use 'Recommended' to allow cooperator to change in case of emergency

# Treatment Fields

## Required or Recommended rules for treatment fields

Rule	Rule ID	Editor	Field	Condition	Columns/Trt Lines
1	Required	Treatments	Registration Number	Always	All

- Not enforced for non-product treatment lines
  - Type = CHK, CROP, or CULT
  - Use new 'CHKT' Type to enforce rule on untreated lines

Treatments - Line 1							
Trt Line	Trt No.	Type	Treatment Name	Form Conc	Form Unit	Form Type	Registration Number
1	1	CHK	Untreated Check				
2	2	FUNG	Tub	250	G/L	EC	
3	3	FUNG	Tub	250	G/L	EC	
4	4	FUNG	Tilt 250	250	G/L	EC	

# Permissions

- Rules added by a user from a different company can still be edited by the **protocol owner**
  - Users from the owner's company can edit these too



Example:

Trialist adds their own rules to a trial

**Sponsor** retains ability to edit/remove the rules

# Hidden Fields

- Rules that hide fields now display on Study Rules editor

Study Rules				
Rule	Rule ID	Editor	Field	Condition
1	Hidden Field	Treatments	Description	If not in my company

- Previously 'Hidden Field' rules did not display on editor
- The *information* the rules hide **remain hidden**

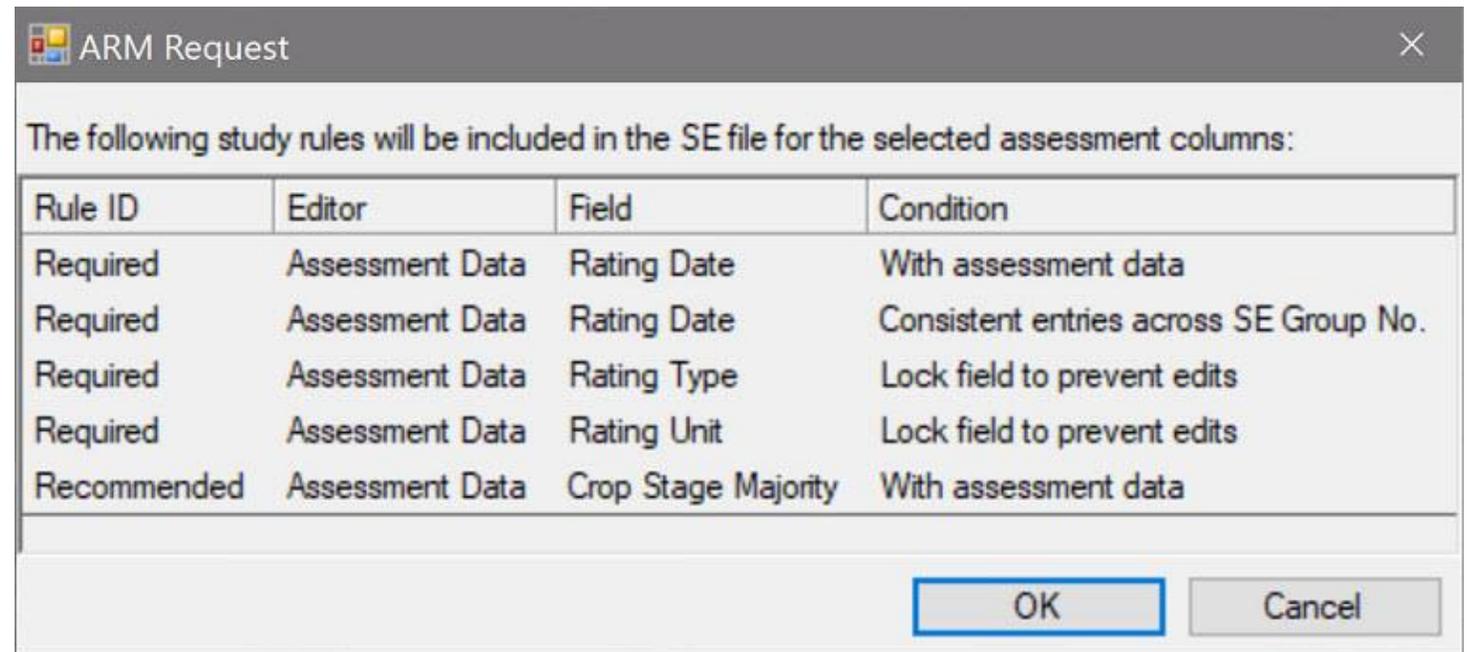
# Standard Evaluations (SE's)

# SE Export

- All study rules for a data column are included in an SE

## What's new?

- Display list of rules that will be included

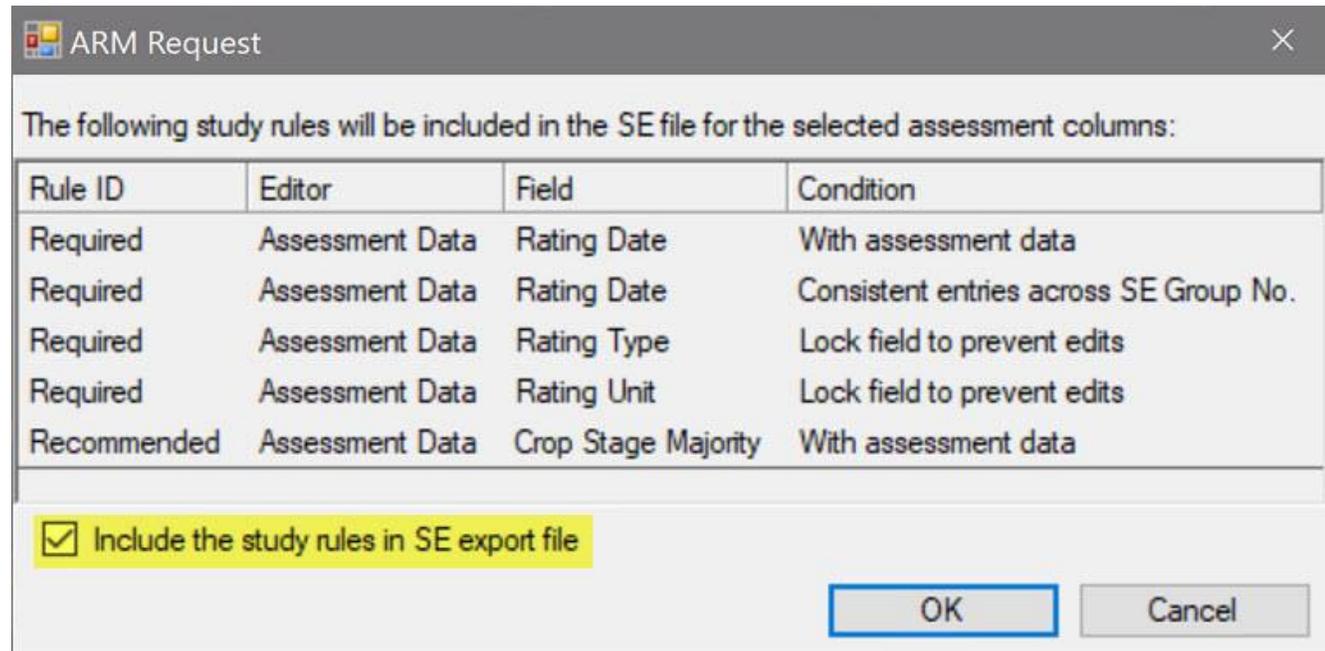


# SE Export

- Leave rules out of SE (only if you are the protocol owner)

## What's new?

- Option to include rules is found on this new dialog



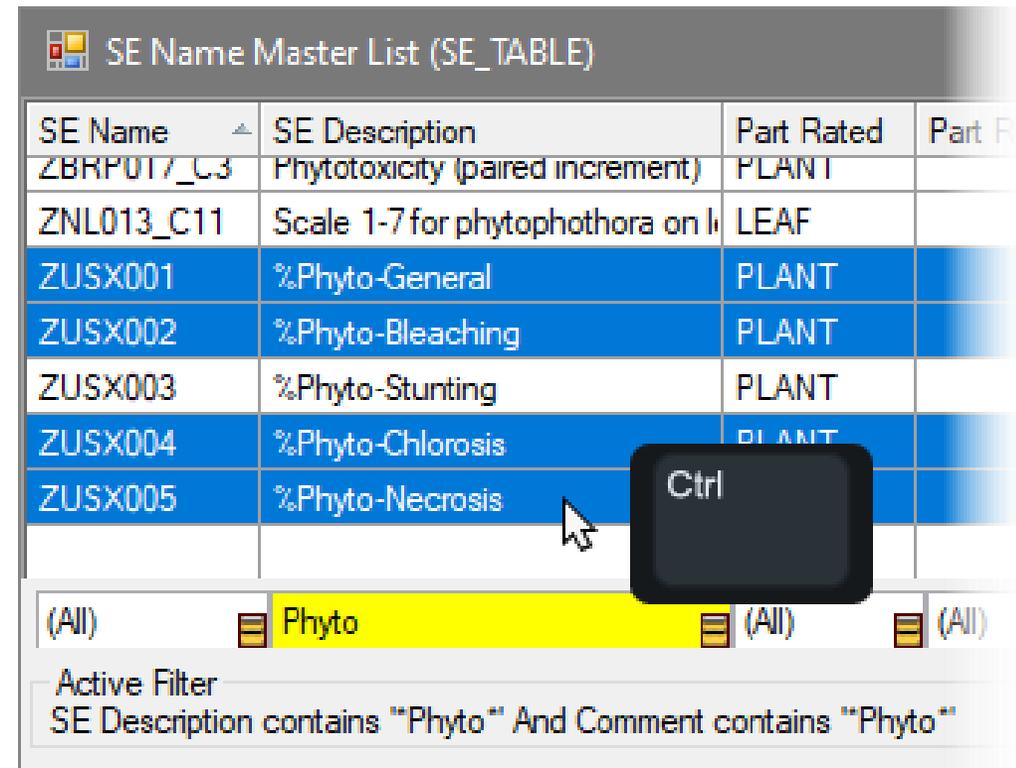
# SE Validation List

Select multiple SE files from SE Name validation list

Loads more than one SE at a time

Hold **Ctrl** button while selecting from list to multi-select

Works on Assessment Data and SE Definitions



SE Name	SE Description	Part Rated	Part R
ZBRP017_C3	Phytotoxicity (paired increment)	PLANT	
ZNL013_C11	Scale 1-7 for phytophthora on l	LEAF	
ZUSX001	%Phyto-General	PLANT	
ZUSX002	%Phyto-Bleaching	PLANT	
ZUSX003	%Phyto-Stunting	PLANT	
ZUSX004	%Phyto-Chlorosis	PLANT	
ZUSX005	%Phyto-Necrosis		

(All)  Phyto  (All)  (All)

Active Filter  
SE Description contains "Phyto" And Comment contains "Phyto"

# Build Headers

SE Definitions tab plans and defines standard evaluations (SEs) to use

Use Tools > 'Build Headers'  
to add selected SEs to  
Assessment Data editor

## What's new?

Build Headers tool now  
available in a trial too

*\*only before data is entered*

SE Definitions		
	1.	2.
Rating Timing	A1-A3	H1
SE Name	F001	Y085
SE Description	% Disease on surface leaf 1	Fresh yield grain in kg / ... m2
Part Rated	LEAF1	GRAIN

Assessment Data - Line 2				
Column Number	1	2	3	4
SE Name	F001	F001	F001	Y085
Part Rated	LEAF1	LEAF1	LEAF1	GRAIN
Rating Type	PESSEV	PESSEV	PESSEV	WEIFRE
Rating Unit	%AREA	%AREA	%AREA	KG
Rating Timing	A1	A2	A3	H1
ARM Action Codes	AA	AA	AA	

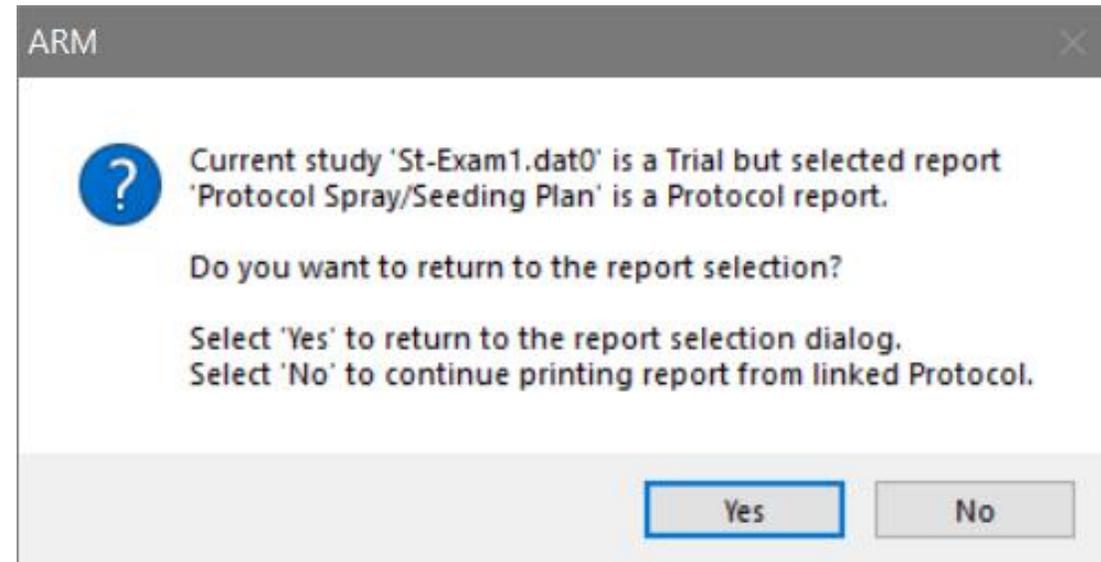
  

+ Sub	Rep	Blk	Col	Plot	1	2	3	4
1	1	1	1	101				

# Reports

# Print Reports

- New warning of report mis-match
- e.g. *protocol* report chosen when a *trial* is open



# Summary Reports

- Choose number of characters to *Clip scrolling fields* at

Data headers

Clip scrolling fields

Clip number of characters at:  

Pest Type			D Disease
Pest Code			SEPTTR
Pest Scientific Name			Mycosphaerella >
Pest Name			Speckled leaf b>
Crop Type, Code	C TRZAW	C TRZAW	C TRZAW
Crop Scientific Name	Triticum aestiv>	Triticum aestiv>	Triticum aestiv>
Crop Name	Winter wheat	Winter wheat	Winter wheat
Part Rated	LEAF C	PLANT C	LEAF3 P
Rating Type	PHYGEN	VIGOR	PESSEV
Rating Unit	%	%	%
Trt Treatment			
No. Name	Plot	1	2
		3	
1 Untreated Check	102	0.00	100.00
	205	0.00	100.00
	303	0.00	100.00
	401	0.00	100.00
Mean =		0.00	100.00
			5.00
			4.10
			4.60
			4.50
			4.55

- Sets width of assessment columns on report, when wide content is present

# Product Amounts Totals

Product Amount Totals Report Options

Report Options Report Preview

Calculation basis

Group products by: Investigator

Additional Site Description fields (information only)

Field 1: Trial ID

Field 2: Study Director

- Include header/site description fields in report
- Group products together when batch printing

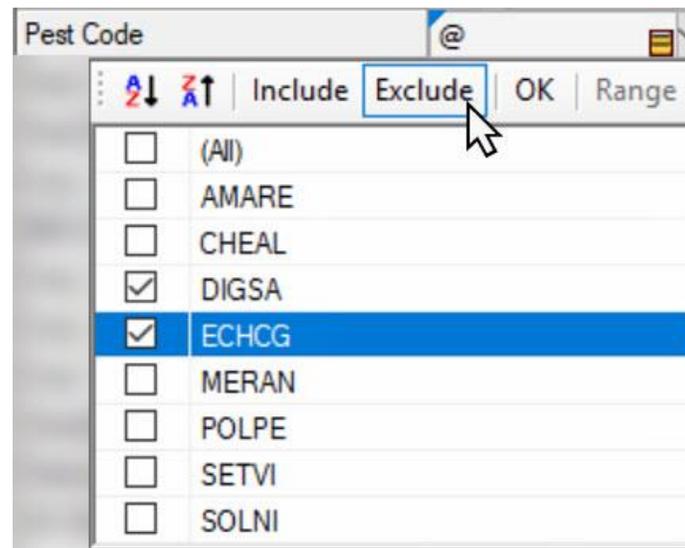
Product quantities required for listed treatments and applications across multiple studies:

Amount*	Unit	Treatment Name	Form Conc	Form Unit	Investigator	Trial ID	Study Director
27.938	mL	Super Stomp	500	GAL	Karl Grossebaume	ST-Exam1	Bill Jenkins
74.500	mL	Stamper	800	GAL	Karl Grossebaume	ST-Exam1	Bill Jenkins
27.938	mL	Super Stomp	500	GAL	Samuel Duclot	ST-Exam2	R.E. Cearch
74.500	mL	Stamper	800	GAL	Samuel Duclot	ST-Exam2	R.E. Cearch
27.938	mL	Super Stomp	500	GAL	Simon Le Hardy	ST-Exam3	R.E. Cearch
55.875	mL	Super Stomp	500	GAL	Your Name	ST-Exam4;ST-Exam5	R.E. Cearch
149.000	mL	Stamper	800	GAL	Your Name	ST-Exam4;ST-Exam5	R.E. Cearch
27.938	mL	Super Stomp	500	GAL	Igor Pexainucs	ST-Exam6	R.E. Cearch
74.500	mL	Stamper	800	GAL	Igor Pexainucs	ST-Exam6	R.E. Cearch

# Add-ins

# Summary across Trials

- Fixed so Exclude option on filter dropdowns correctly excludes all items selected from the list.



# Summary across Trials

- Turn off mean comparison test to use ST for data extraction instead of analysis

## What's new?

- Include non-analyzable data columns in summary
  - Action Codes =  
NM, TTAB, TUPOC, THT, REL

