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ARM 2023 Changes

New Protocol wizard

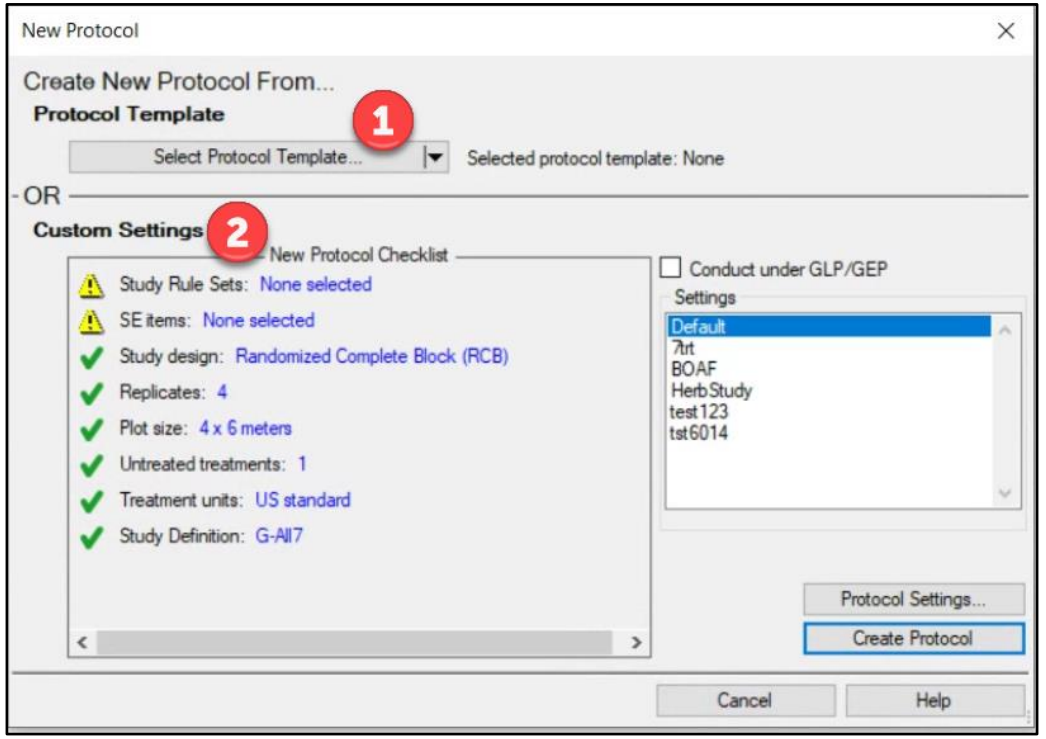
Protocol Creation

Streamlined process for creating a new Protocol

Choose from two options:

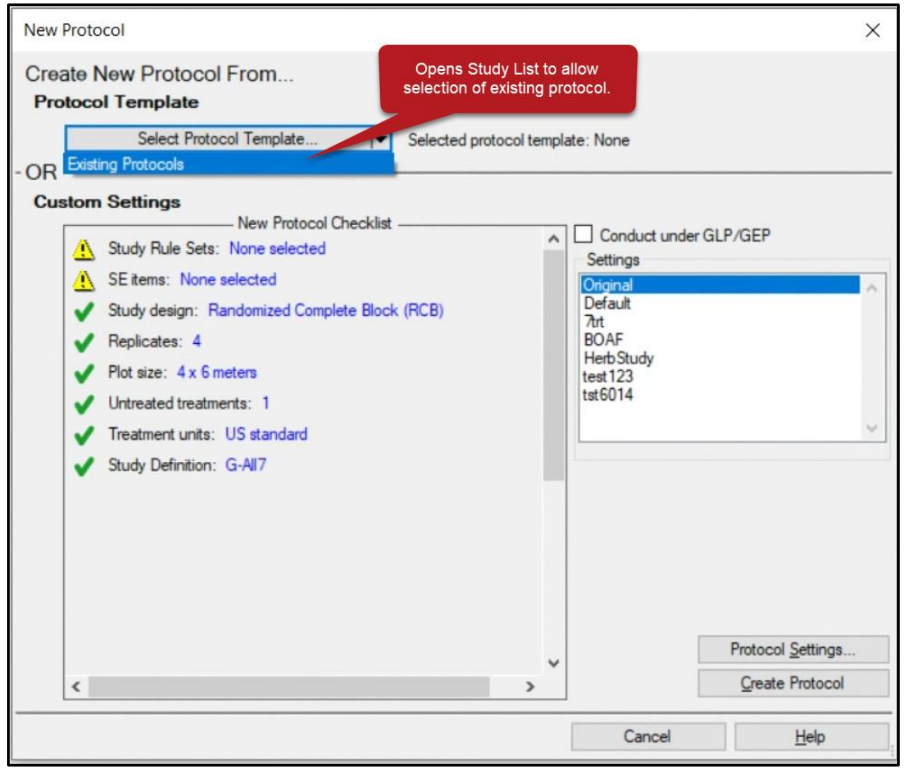
1. Protocol Templates
2. Custom Settings/Protocol Checklist

   (build from scratch)



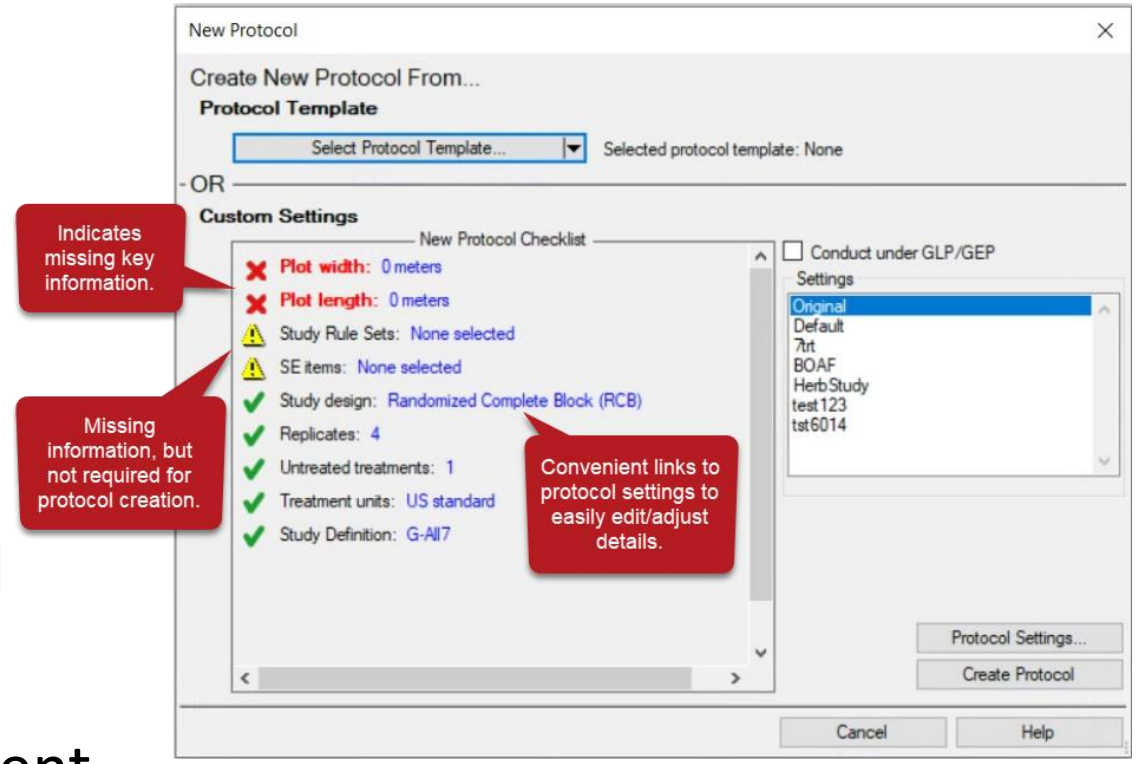
Protocol Creation

1. Protocol Templates
   - Copy selected sections from an existing protocol
   - Best way to create protocols similar to previous studies (replaces ‘Save As’ function)
     - Pick and choose which information to copy, eliminating need to review and update all fields in protocol



Protocol Creation

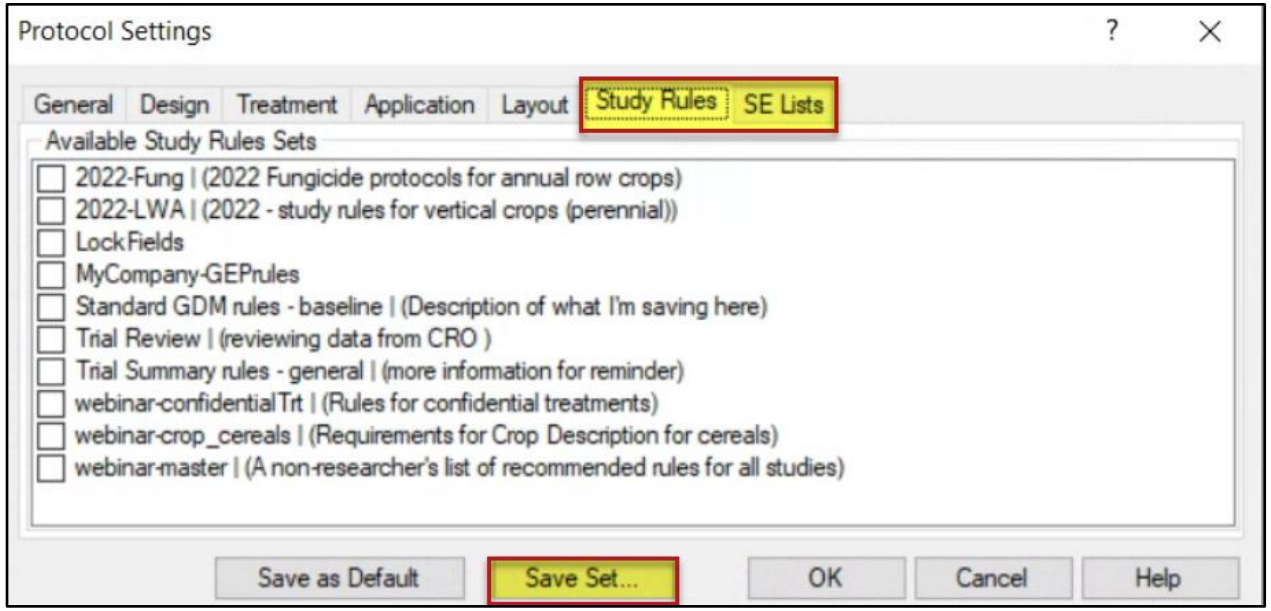
2. Protocol Checklist (build from scratch)
   - Interactive overview of study settings prior to protocol creation
   - Missing required information designated by **X**
   - ⚠ designates missing recommended information
   - Easily edit/adjust details with convenient links to protocol settings dialog



Protocol Setup

‘Study Rules’ and ‘SE Lists’ tabs on New Protocol Settings dialog

- Load SE files and Study Rule sets during initial protocol setup
- Select multiple SE files and Study Rule sets at a time
- Use ‘Save Set’ to save configured Settings options to use in the future
  - Now includes SEs and Study Rules!



Assessment Editor

Improved assessment view

Header fields re-organized into logical groups

Added ability to collapse and expand groups

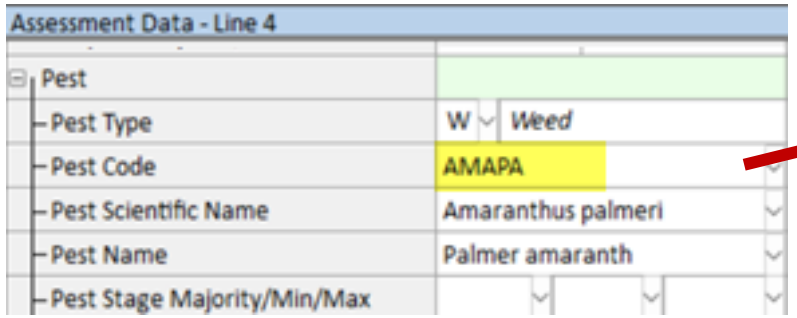
- Can still hide and view individual rows in view

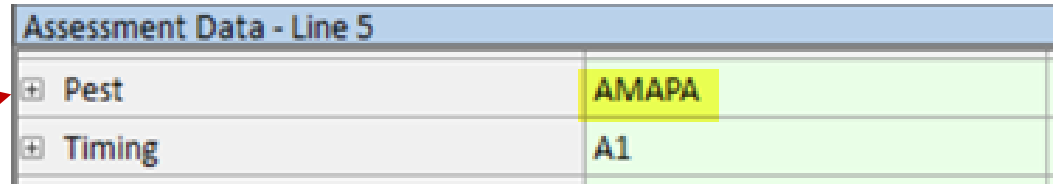
Column Number	1	
Rating Date	10-Jun-21	
Standard Evaluation (SE)		
SE Description	Count rating for Colby Interaction	
Part Rated	PLANT	P
Rating Type	COUNT	
Rating Unit/Min/Max	NUMBER	
Sample Size	1	PLOT
Number of Subsamples	1	
Crop	TRZAS	
Pest	1KCHG	
Timing		
Days After First/Last Applic.	*9*	*9*
Trt-Eval Interval	9 DA-A	
Plant-Eval Interval		
Miscellaneous		

Column Number	1	
Rating Date	10-Jun-21	
Standard Evaluation (SE)		
SE Description	Count rating for Colby Interaction	
Part Rated	PLANT	P
Rating Type	COUNT	
Rating Unit/Min/Max	NUMBER	
Sample Size	1	PLOT
Number of Subsamples	1	
Crop		
Crop Type, Code	C	TRZAS
BBCH Scale	*BCER*	
Crop Scientific Name	Triticum aestivum	
Crop Name	Spring wheat	
Crop Variety		
Crop Stage Scale		
Crop Stage Majority/Min/Max		
Pest		
Pest Type	W	*Weed*
Pest Code	1KCHG	
Pest Scientific Name	Kochia	
Pest Name	Kochia	
Pest Density		
Pest Density Min/Max		
Timing		
Days After First/Last Applic.	*9*	*9*
Trt-Eval Interval	9 DA-A	
Plant-Eval Interval		
Miscellaneous		
Description		
ARM Action Codes		
Number of Decimals		

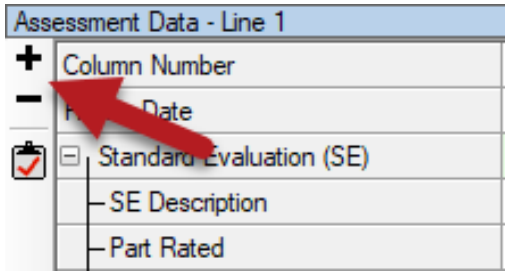
Improved assessment view

When collapsed, primary information still shown





Buttons to expand/collapse all groups:



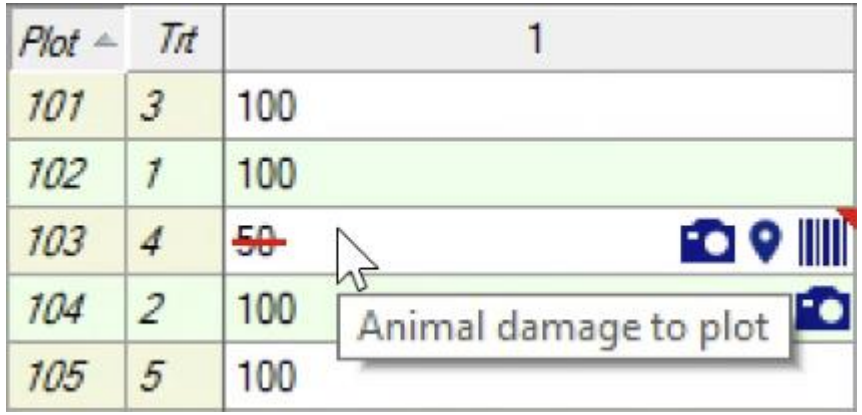
View files now include expanded/collapsed state

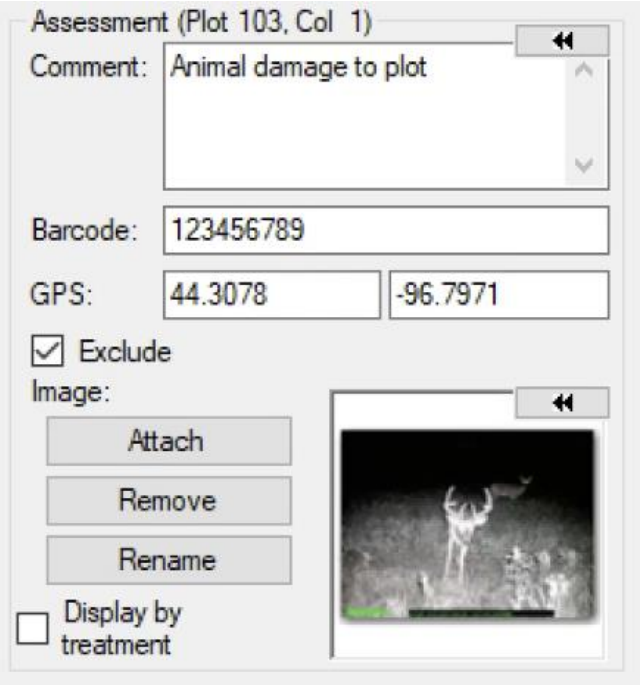
- Re-save your previous views to include this functionality

Assessment Icons

Visualize additional assessment information on data editor

- Icons for: GPS, Images, Barcode
- Comments display as tooltips
- Exclude (formerly ‘Damaged’) as strike-though

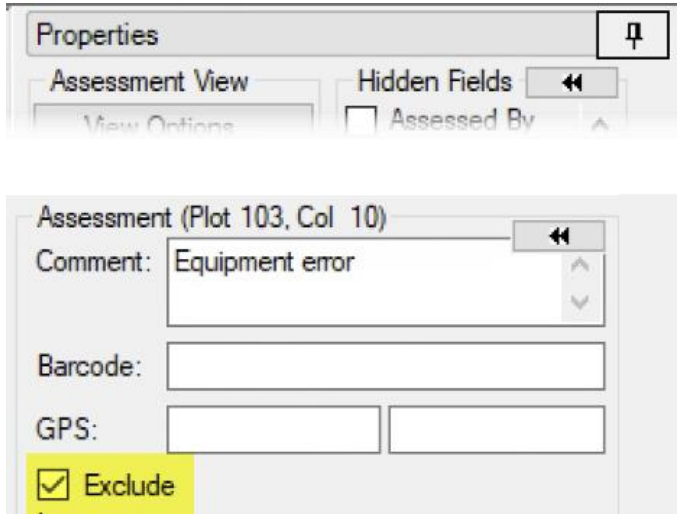




Exclude Data Points

Renamed ‘Damaged’ checkbox to ‘**Exclude**’

- Removes the selected data point (plot/subsample) from analysis
- *More reasons to remove data than just a damaged plot!*



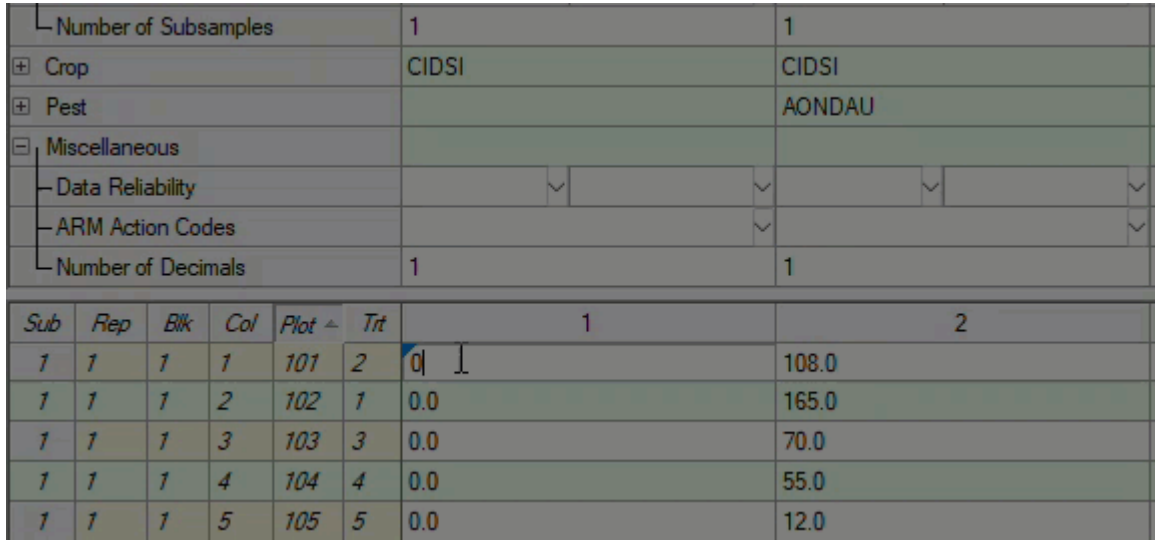
Plot	Trt	10	11	12 (Calculated)
101	3	8.70	13.0	8.99
102	1	8.25	12.1	8.62
103	4	~~4.10~~	~~11.7~~	~~4.30~~
104	2	8.95	11.2	9.44

Equipment error

Data Reliability

New shortcut buttons to quickly set Data Reliability

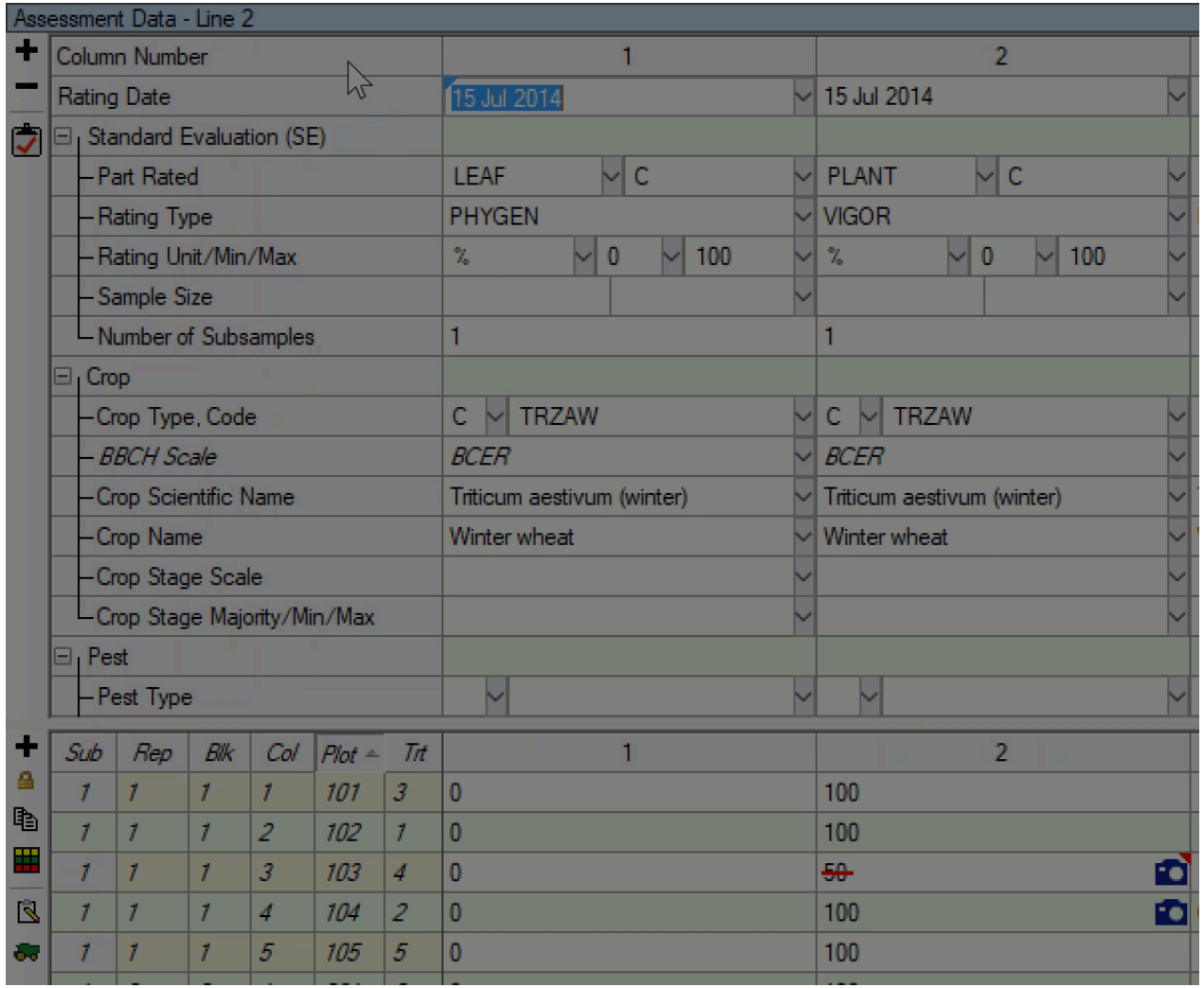
- Communicate what data to use in summaries
  - Exclude = conclusions should **not** be made from this assessment column
  - Good = conclusions can be made from this assessment column
  - Best = conclusions can be made, prioritized over related assessments



Assessment Header

Double-click grid separator to auto-size header grid area

Useful when collapsing sections to view more plot data

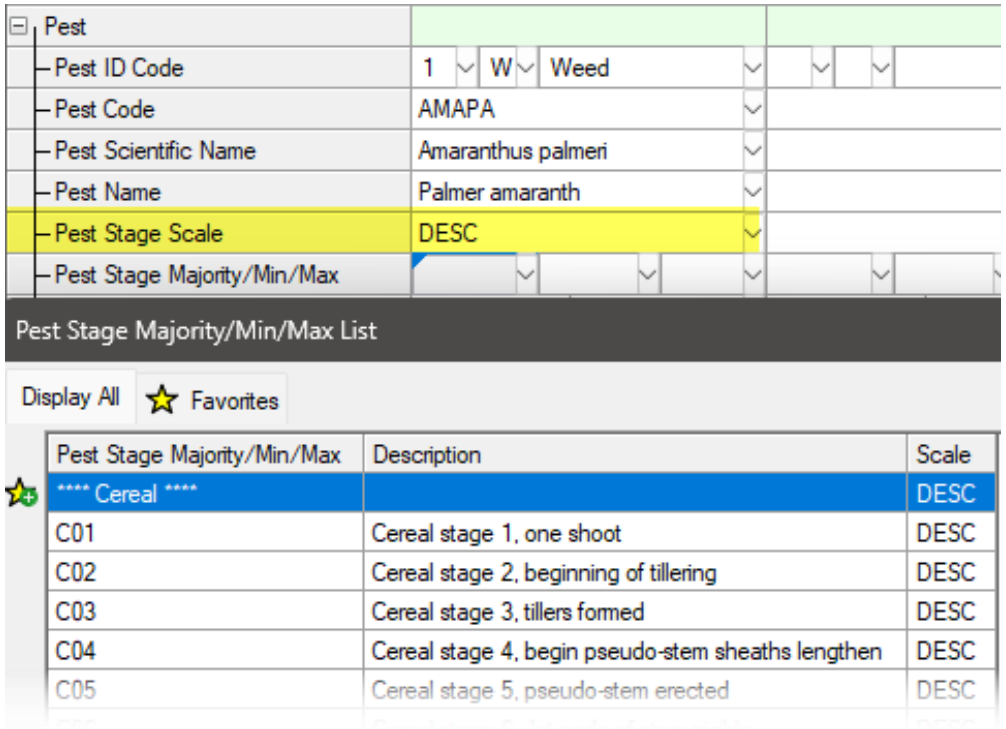


Assessment Header

Added **Pest Stage Scale** field

Stage Majority/Min/Max lists are now based on Scale choice

Defaults to scale chosen on Pest Stage at Appl tab



Disease Severity calculation

Added Townsend-Heuberger severity calculations from subsamples,
for all scales 0-2 through 0-10

(previously had just 0-4 and 0-10)

ARM Action Codes List

ARM Action Codes	Description
@TH02[n]	Townsend-Heuberger 0-2 disease scale from ratings summarized at plot level in separate
@TH02S[n]	Townsend-Heuberger 0-2 disease scale from subsamples (n=column, 0=no attack)
@TH03[n]	Townsend-Heuberger 0-3 disease scale from ratings summarized at plot level in separate
@TH03S[n]	Townsend-Heuberger 0-3 disease scale from subsamples (n=column, 0=no attack)
@TH04[n]	Townsend-Heuberger 0-4 disease scale from ratings summarized at plot level in separate
@TH04S[n]	Townsend-Heuberger 0-4 disease scale from subsamples (n=column, 0=no attack)
@TH05[n]	Townsend-Heuberger 0-5 disease scale from ratings summarized at plot level in separate
@TH05S[n]	Townsend-Heuberger 0-5 disease scale from subsamples (n=column, 0=no attack)
@TH06[n]	Townsend-Heuberger 0-6 disease scale from ratings summarized at plot level in separate
@TH06S[n]	Townsend-Heuberger 0-6 disease scale from subsamples (n=column, 0=no attack)
@TH07[n]	Townsend-Heuberger 0-7 disease scale from ratings summarized at plot level in separate
@TH07S[n]	Townsend-Heuberger 0-7 disease scale from subsamples (n=column, 0=no attack)
@TH08[n]	Townsend-Heuberger 0-8 disease scale from ratings summarized at plot level in separate
@TH08S[n]	Townsend-Heuberger 0-8 disease scale from subsamples (n=column, 0=no attack)
@TH09[n]	Townsend-Heuberger 0-9 disease scale from ratings summarized at plot level in separate
@TH09S[n]	Townsend-Heuberger 0-9 disease scale from subsamples (n=column, 0=no attack)
@TH010[n]	Townsend-Heuberger 0-10 disease scale from ratings summarized at plot level in separate
@TH010S[n]	Townsend-Heuberger 0-10 disease scale from subsamples (n=column, 0=no attack)

Planned Comparisons (Contrasts)

Contrasts

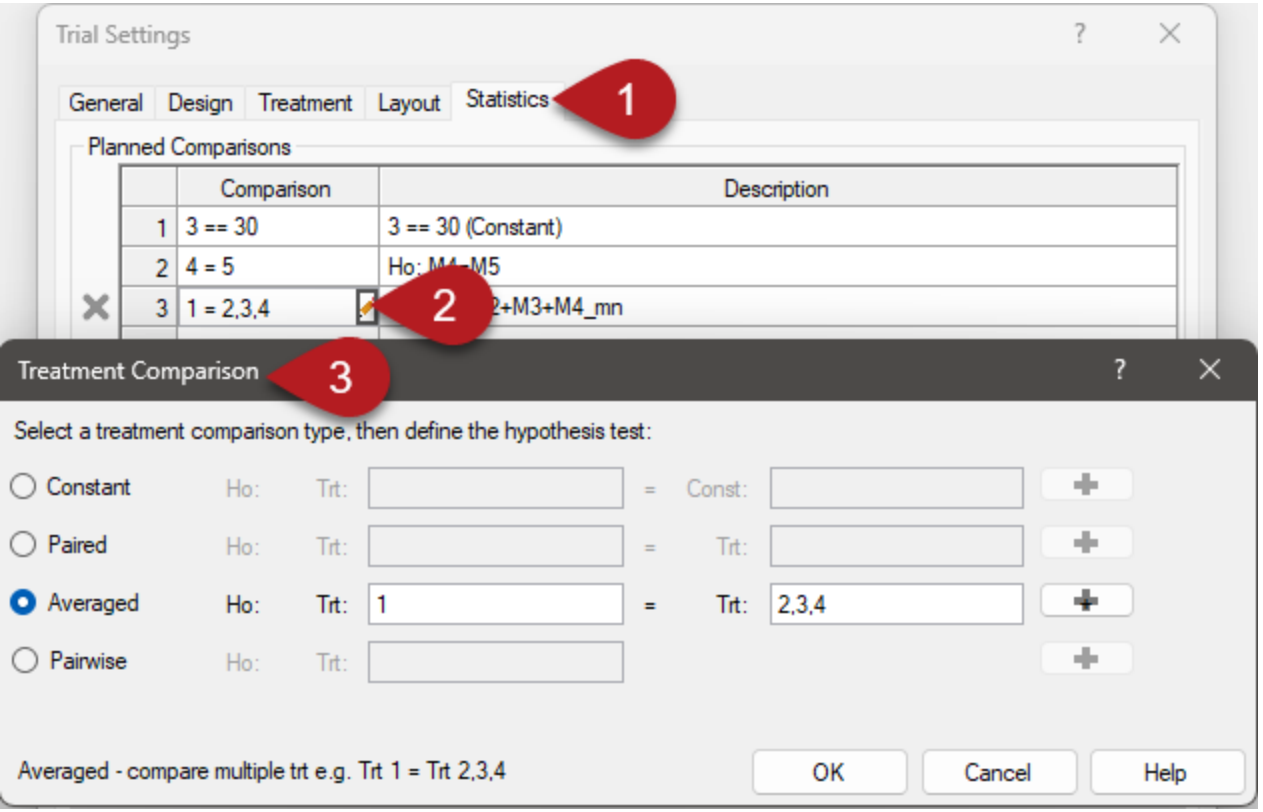
Define comparisons of specific treatments for a custom analysis

Analysis uses *contrasts* - statistical tests on linear combinations of values derived from data

Common uses:

- Compare a trt to >1 checks or standard products
- Avoid excluding data
- Multi-factor designs (e.g. compare trt 1-3 vs. trt 4-6 vs. trt 7-9)

Define Comparisons



Settings > **Statistics** tab > Planned Comparisons table

Pencil icon opens Wizard

Select type of comparison, then define components to compare

Available in Protocol and Trial

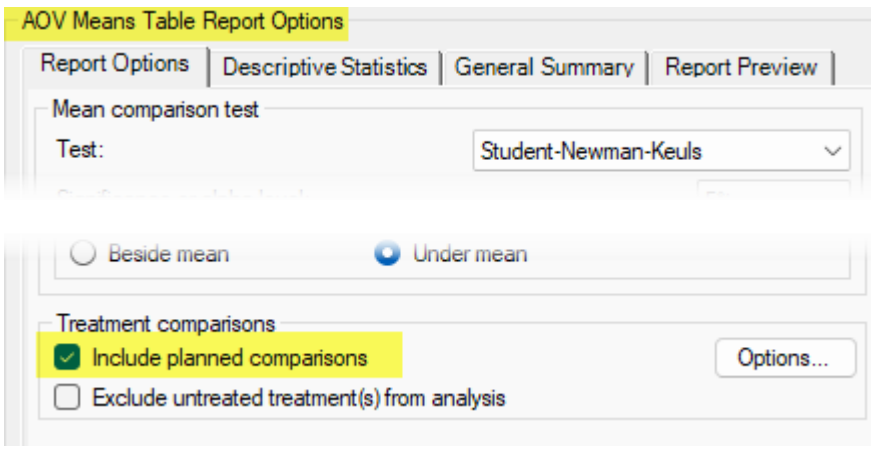
Output

‘Include planned comparisons’ option

For each planned comparison:

- Contrast value and test statistic
- P-value of comparison hypothesis

If significant (< 0.05), reject Ho and conclude there is a difference between compared treatments



Character Rated Rating Type Rating Unit/Min/Max Number of Subsamples		Cadence 14	Speed SPEED m/s, -, - 14	Stride Leng LENGTH m, -, -
Trt No.	Treatment Name	*	*	*
1	Fast 2	89.55 -	3.36 -	2.25 -
6	Zoom Elite	90.03 -	3.36 -	2.23 -
Planned Comparisons				
Traditional vs Fulcrum				
Estimate		-0.151	0.032	0.026
t Value		-0.578	1.072	1.632
Pr > |t|		0.569	0.297	0.118
Traditional vs Newton				
Estimate		0.136	0.005	0.000
t Value		0.424	0.148	-0.003
Pr > |t|		0.676	0.884	0.998
Excluding Zoom Elite				
Mean square		0.698	0.004	0.002
F value		1.706	0.735	1.372
Pr > F		0.175	0.575	0.267

Types of Comparisons

For more examples and statistical details, see:
gdmdata.com/media/documents/UserContrasts.pdf

- **Constant** – compare one trt to a specified value/constant
  - e.g. Treatment 3 average = value of 100
- **Paired** – a 1:1 comparison of one treatment to another
  - e.g. Treatment 4 = Treatment 5
- **Averaged** – compare a trt against the average of >1 other trt
  - e.g. compare a product to multiple checks
  - Note: only need to list the treatments in ARM, not the full equation

Types of Comparisons

For more examples and statistical details, see:
gdmdata.com/media/documents/UserContrasts.pdf

- **Pairwise** – compare all treatments to each other
  - Equivalent to AOV, so get same result as Treatment P(F)
  - *Tip*: Great way to exclude UTC without throwing out the data!
- **Multiple comparisons** – logical AND to combine 2+ comparisons into a single test
  - e.g. Light (Trt 1,2) vs.
    Medium (Trt 3,4) vs.
    Heavy (Trt 5,6)

Protocol Planning

Trial Location table

Limit who can view individual rows on Trial Location table with these new fields:

- Company ID
- GDM ID
- Company Name

Trial Location

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

Protocol Author

Country	State	Region	Trial Year	Trial ID	Responsible	GDM ID	Company ID	Company Name	Investigator	Number of Trials
				CreateTrial	Name		12	Comp1		1
				EditTrialMap	Trialist2		345	2Cmpy		2
				MakeAnApplication	Trialist3		32	C3		1
				RecordSiteInfo	Trialist4		1357	Fourth		1
				EnterData	Trialist5		12	Comp1		1

Trialists only see rows from their own company (via GDM ID or Company ID)

Trial Location

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

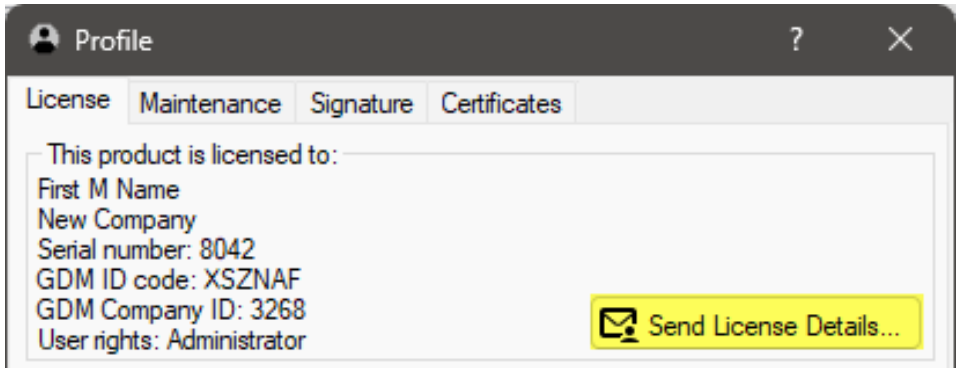
Trialist @ Comp1

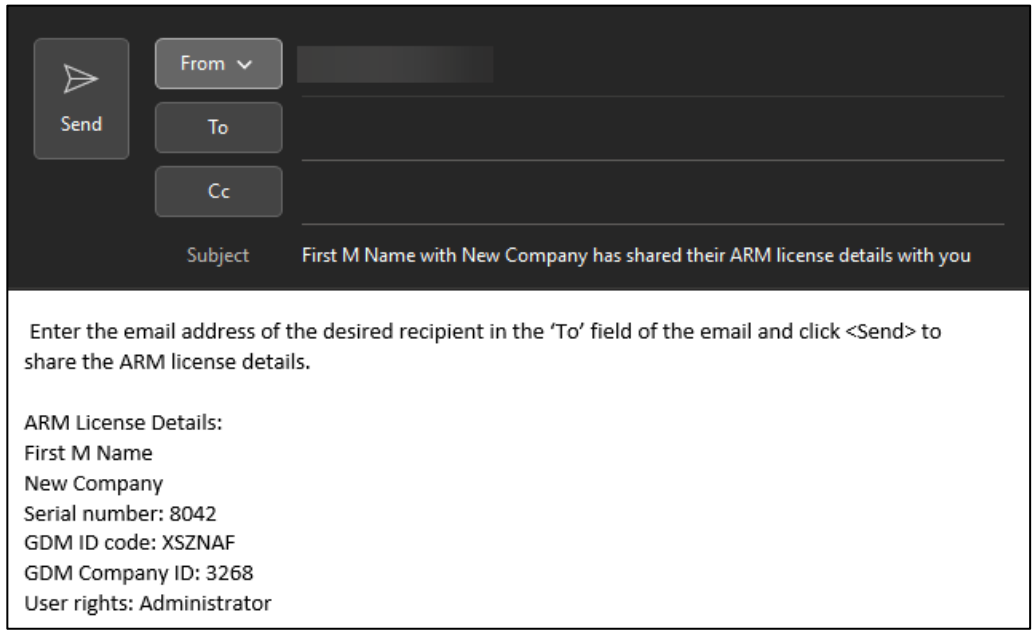
Country	State	Region	Trial Year	Trial ID	Responsible	GDM ID	Company ID	Company Name	Investigator	Number of Trials
				CreateTrial	Name		12	Comp1		1
				EnterData	Trialist5		12	Comp1		1

Trial Location table

How to obtain GDM ID/Company ID from contractors?

Help > Profile > “Send License Details” button

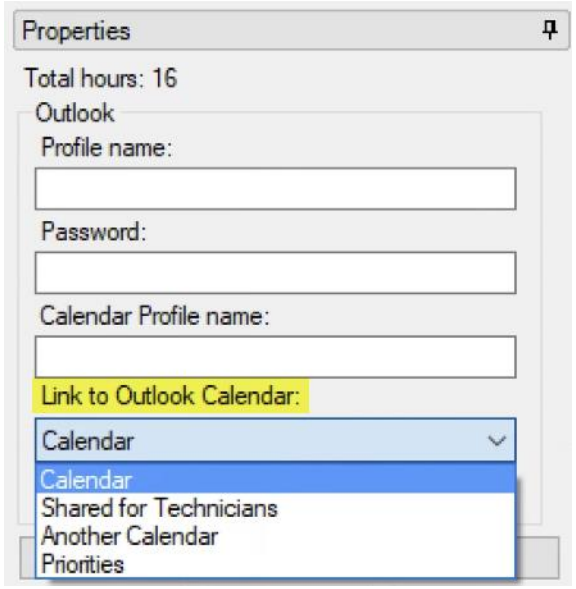




Schedule Tasks

Connect to Outlook

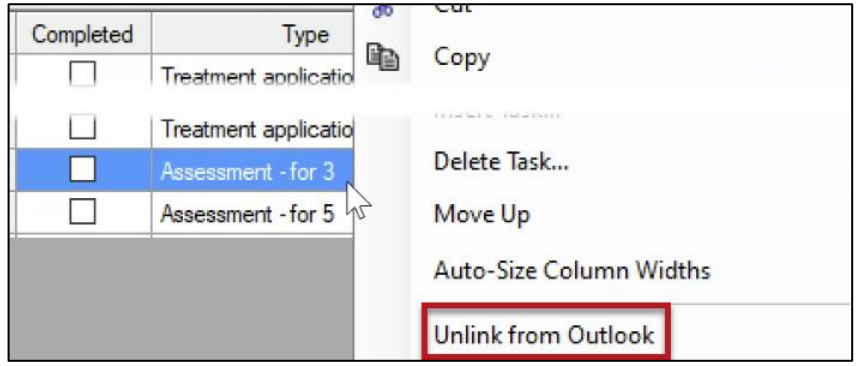
Send ARM tasks to any calendar linked in Outlook



	Completed	Type		Assigned to	Outlook Profile	Link to Outlook Calendar
1	☐	Treatment application - for A	A		matt@gdmdata.	Calendar
2	☐	Assessment - for 1	A	Study leader	matt@gdmdata.	Calendar
3	☐	Treatment application - for B	A	Technician 1	matt@gdmdata.	Shared for Technicians
4	☐	Assessment - for 2	A	Technician 1	matt@gdmdata.	Shared for Technicians
5	☐	Treatment application - for C	A	Technician 1	matt@gdmdata.	Shared for Technicians
6	☐	Assessment - for 3	A	Technician 1	matt@gdmdata.	Shared for Technicians
7	☐	Assessment - for 5	H	Harvest reponsible	matt@gdmdata.	Shared for Technicians
8	☐	Other - Reporting	D	Data Manager	matt@gdmdata.	Calendar

Previously could only send to the default calendar, limiting sharing options

Connect to Outlook

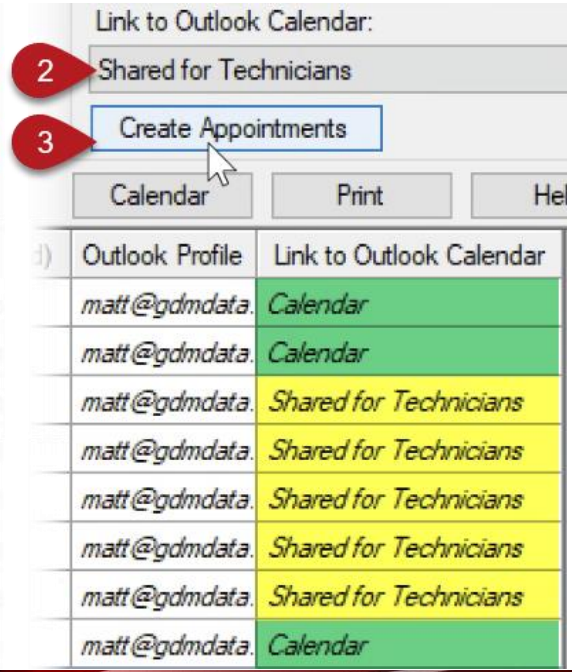


Right-click to unlink task from Outlook

Send tasks to different calendars by unlinking then sending again

	Completed	Type	Outlook Profile	Link to Outlook Calendar
1	☐	Treatment application - for A	matt@gdmdata.	Calendar
2	☐	Assessment - for 1	matt@gdmdata.	Calendar
3	☐	Treatment application - for B		
4	☐	Assessment - for 2		
5	☐	Treatment application - for C		
6	☐	Assessment - for 3		
7	☐	Assessment - for 5		
8	☐	Other - Reporting	matt@gdmdata.	Calendar

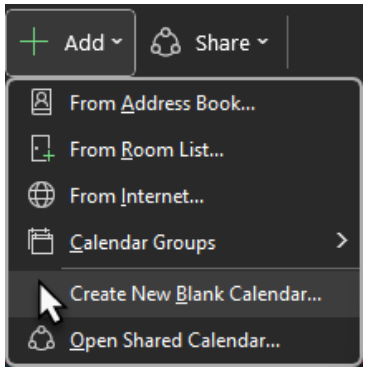
1



Connect to Outlook

How do I create a new calendar?

- Calendar > Add > Create New Blank Calendar…



How do I share this calendar?

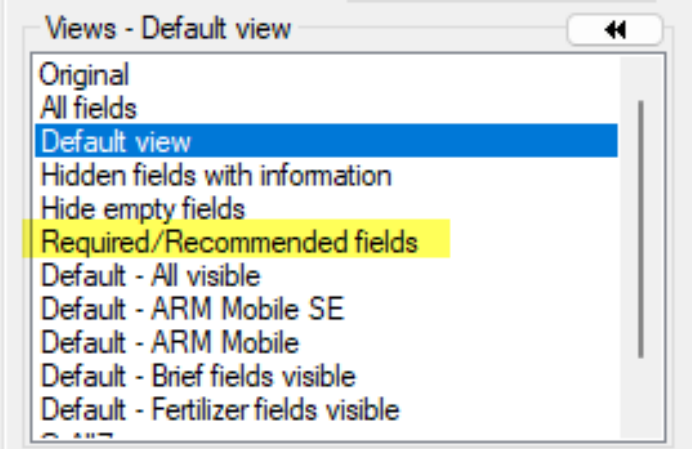
- Calendar Properties > Permissions > Add > [Person] + Can Edit

Editor View

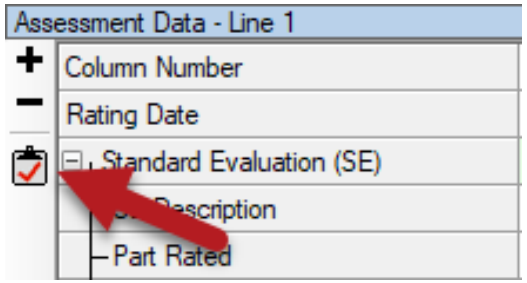
Required/Recommended Fields

New automatic view for editors: Required/Recommended Fields

- Displays only fields that have a Required or Recommended study rule
  - *Includes Conditional rules, and built-in configuration rules*
- Available on Treatments, Site Description, Assessment Data editors



- Also a shortcut in assessment header:



Tip: to revert to the standard view, select “Default view” from list

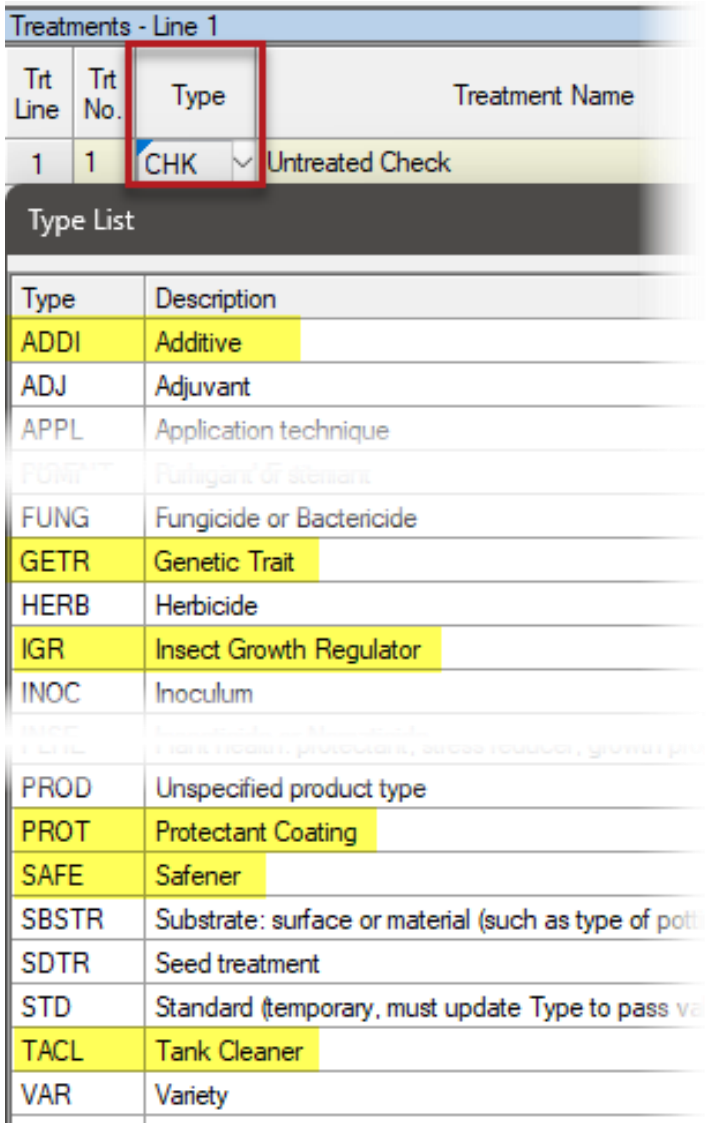
Treatments

Treatment Type

New Types added:

- ADDI - Additive
- GETR - Genetic Trait
- IGR - Insect Growth Regulator
- PROT - Protectant Coating
- SAFE - Safener
- TACL - Tank Cleaner

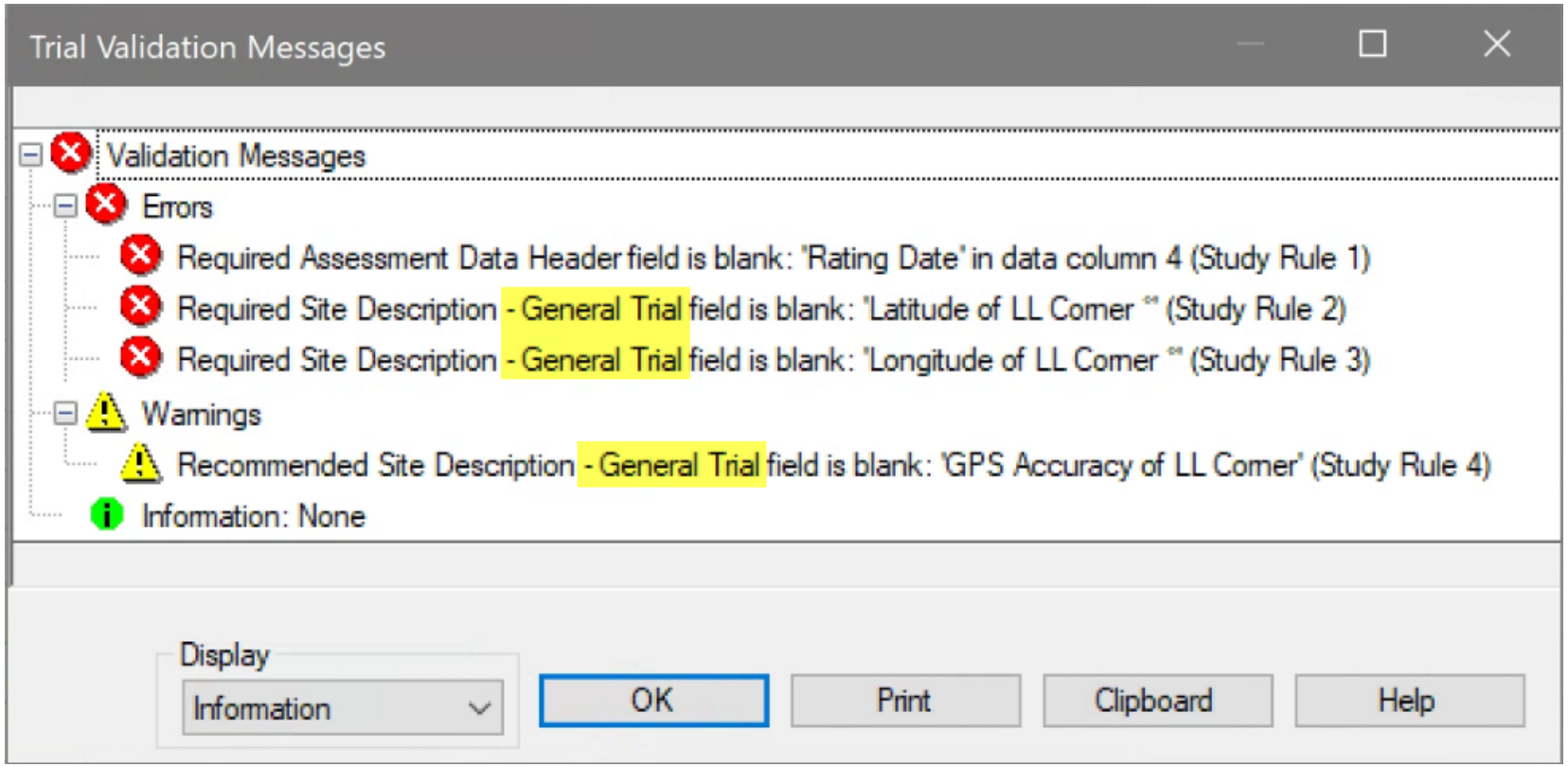
Treatment Type is used for grouping products into separate Treatment lists



Validation

Validation messages

Added Site Description tab/section names for Study Rules

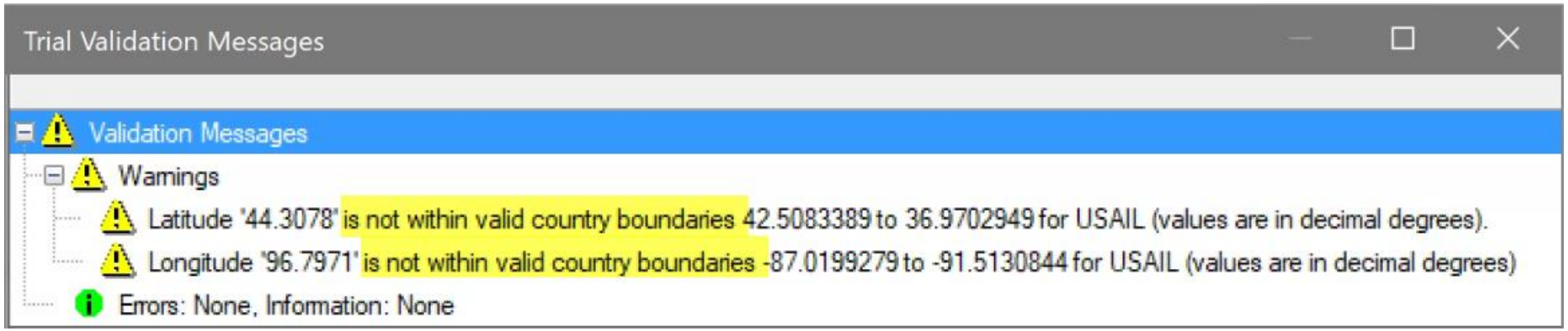


Weather Import

Weather Import

GPS Coordinates are now validated prior to importing weather

- ARM checks against define GPS boundaries for Country and State/Prov.



Weather details may be inaccurate if coordinates are not correct

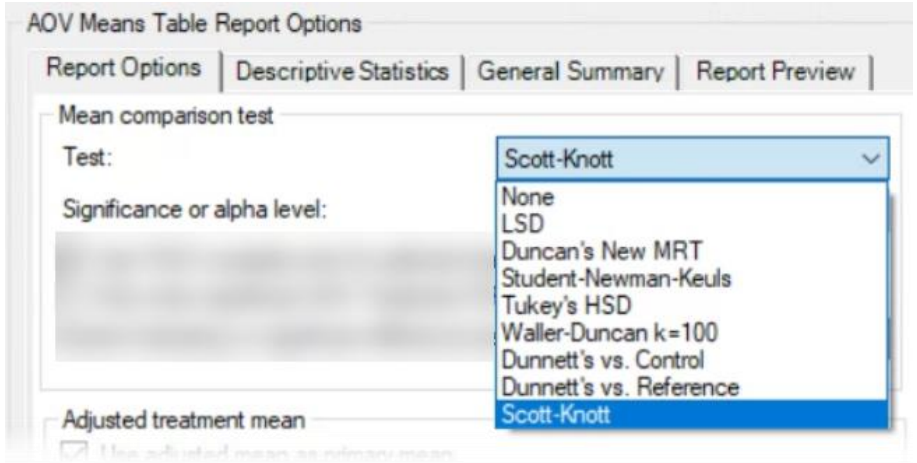
AOV Means Table

Scott-Knott analysis

New mean comparison option: Scott-Knott

- Assigns treatments to a cluster, and each cluster/group is assigned a single letter
- Groups are considered different based on a likelihood ratio test computed from the between-group sums of squares.
- Used for registration purposes in Brazil

Rating Date		Jun-22-2014	Jul-5-2014
Part Rated		PLANT, P	PLANT, P
Rating Type		COUDIS	COUDIS
Rating Unit/Min/Max		%, 0, 100	%, 0, 100
Crop Type, Code		C, TRZAW	C, TRZAW
Crop Name		Winter wheat	Winter wheat
Pest Code		ERYSGT	ERYSGT
Pest Name		Powdery mildew >	Powdery mildew >
Trt No.	Treatment Name	2	3
1	Sure Kill	30.8 c	44.2 d
2	Sure Kill Super Stomp	40.8 b	61.7 b
3	Sure Kill 930401	26.7 d	42.5 d
4	Sure Kill 930401	21.7 e	24.2 e
5	Sure Kill	31.7 c	42.5 d
6	Sure Kill	41.7 b	52.5 c
7	Super Stomp	22.5 e	24.2 e
8	Untreated	70.0 a	93.2 a

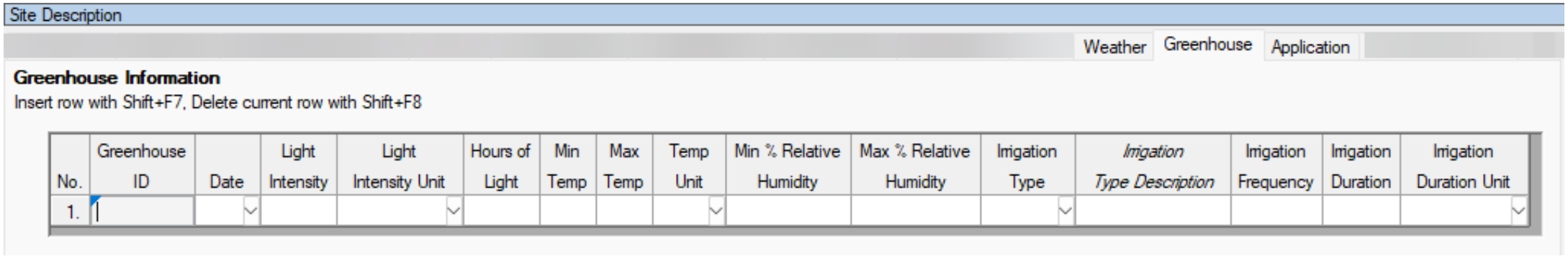


Entry Field Changes

Greenhouse

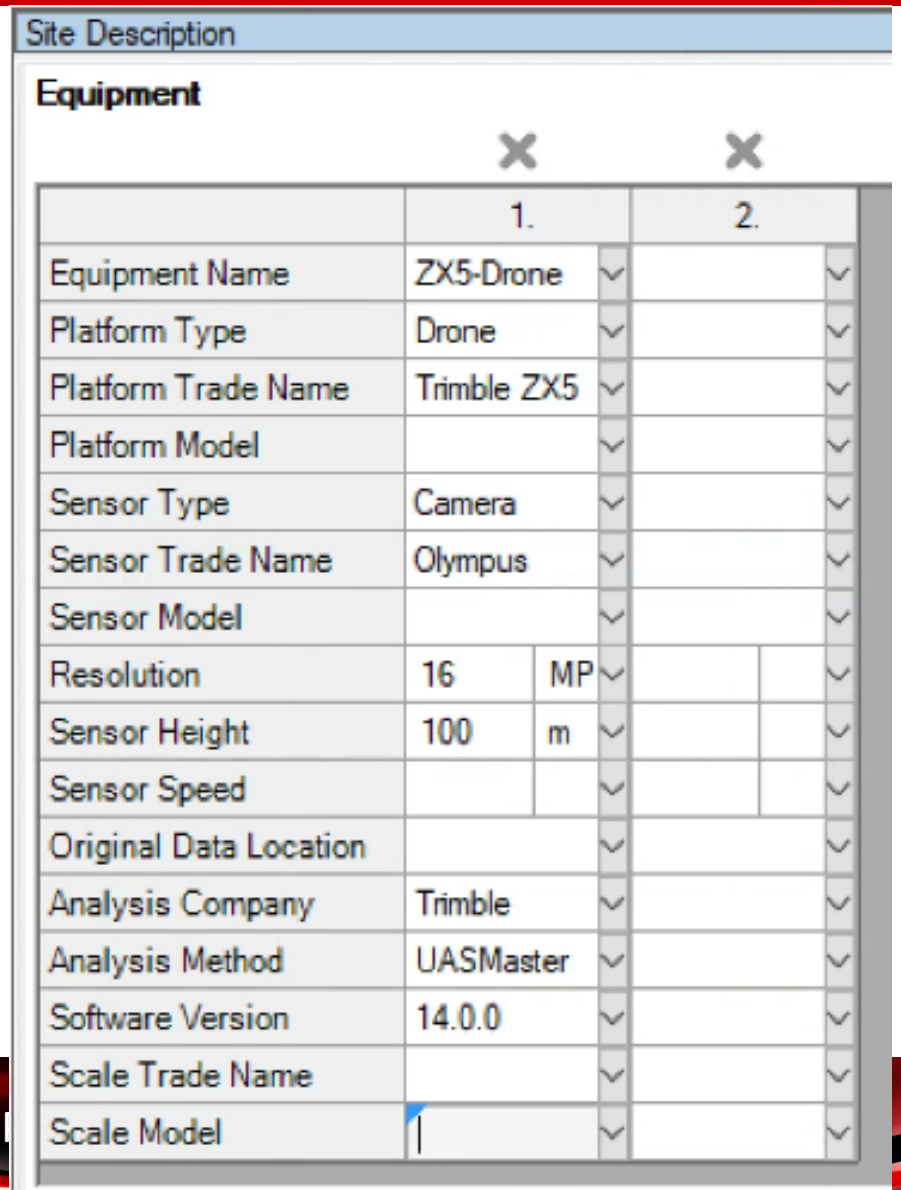
New Site Description tab: **Greenhouse**

Document environmental conditions daily throughout the study



Field trials should still use Weather tab for documenting conditions

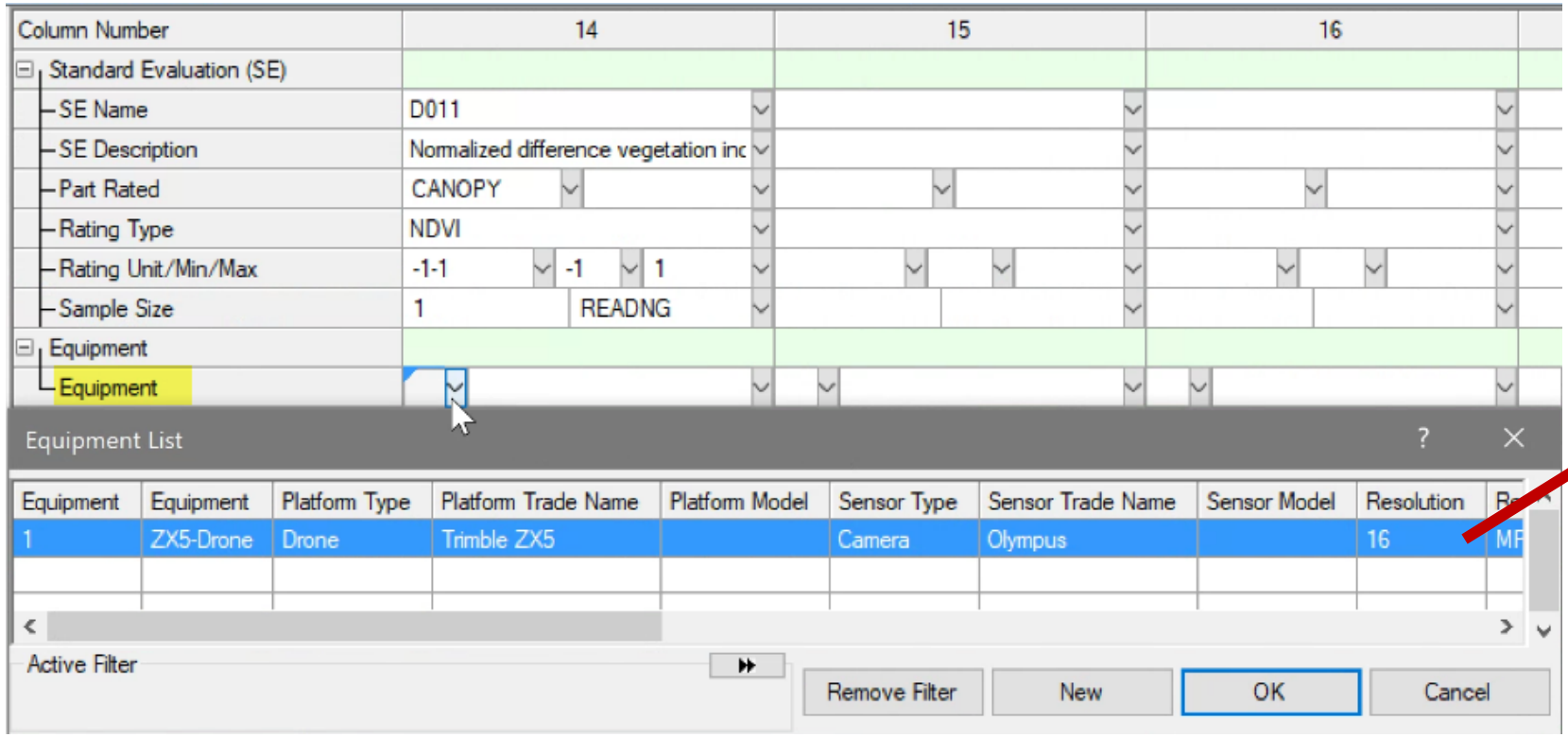
New Tab: Equipment

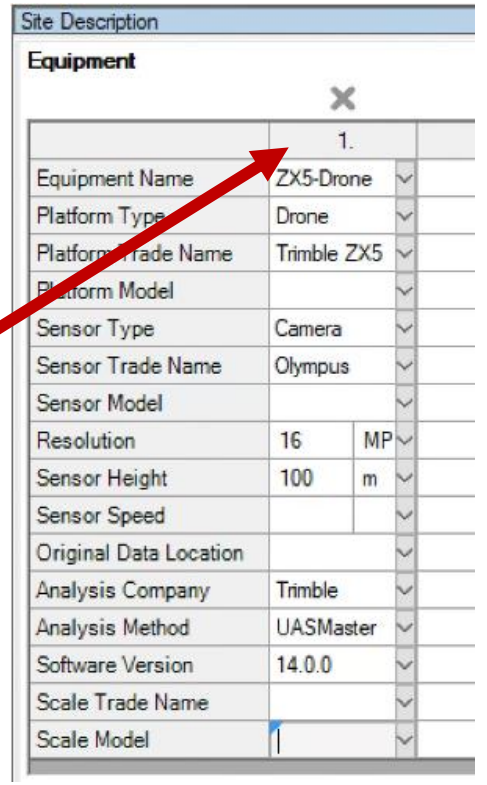


- Document details about equipment used in the trial
- Save all details to Favorites from Equipment Name field
- *Skip rows that are not pertinent to that equipment*

New Tab: Equipment

Link assessment column to Equipment details using ID field

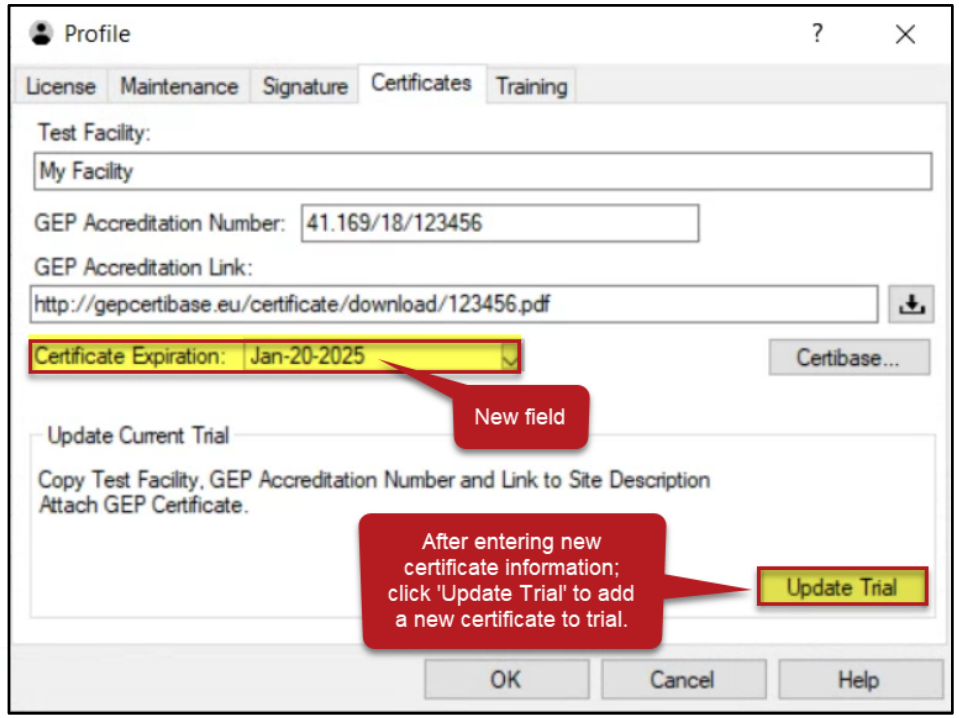




Regulations

Document multiple GEP Accreditation Certificates in a single trial

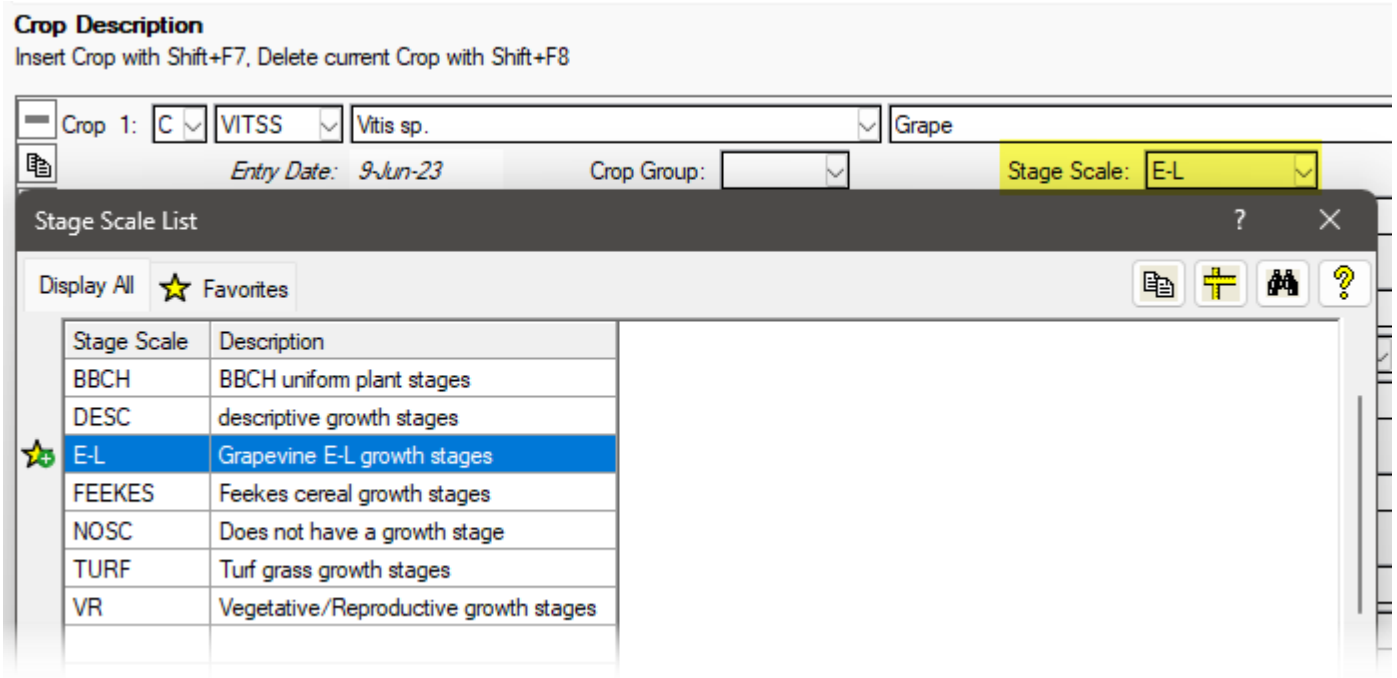
- New field: Certificate Expiration
- Add new certificate if current expires before finishing trial
- ‘Update Trial’ adds new repeating section
- Delete old certificates with simple button click

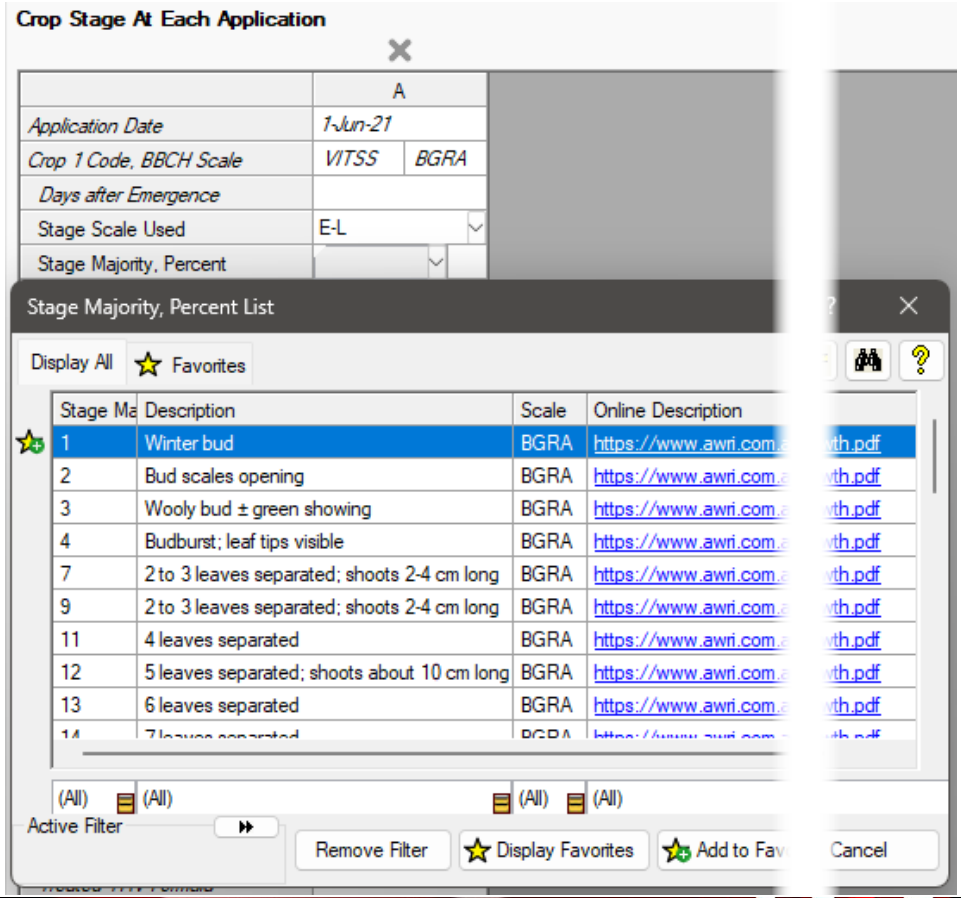


Grapevine E-L Growth Stages

Added support for E-L growth stages for viticulture

- ARM can convert between BBCH and E-L

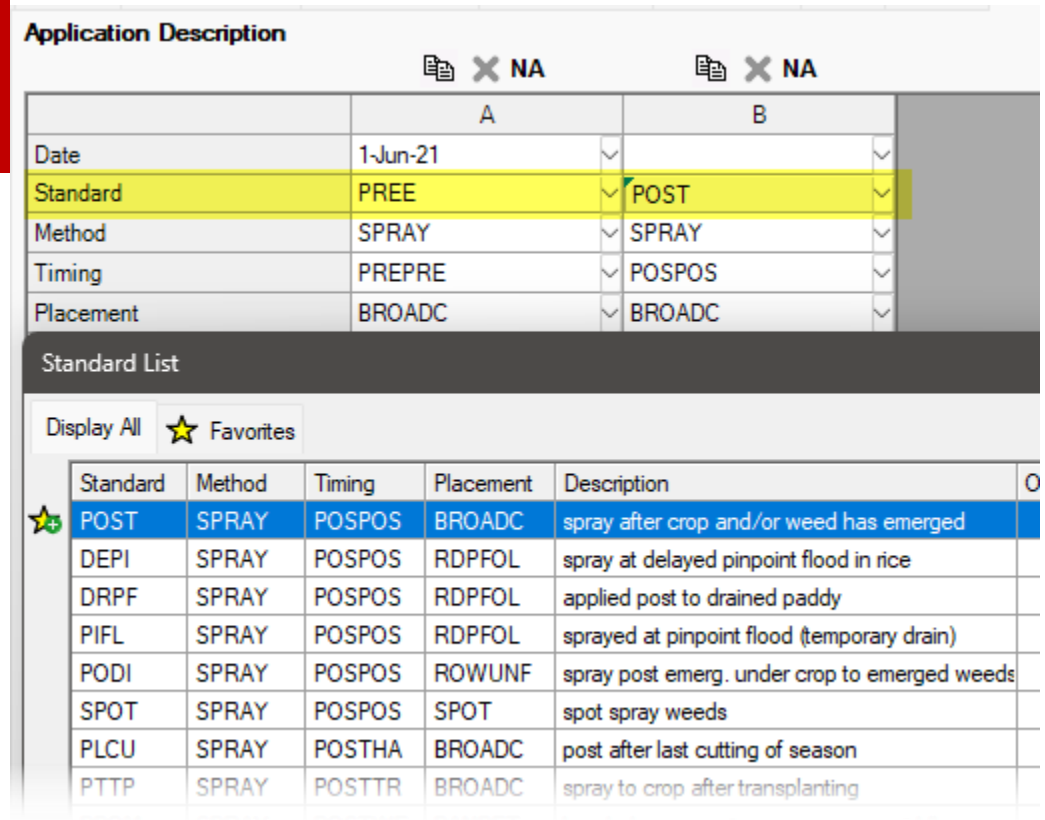




Application Standard

Standardized application description list, a combination of:

- Method
- Timing
- Placement



Add ones that match to your Favorites List to save time and increase consistency with describing your applications

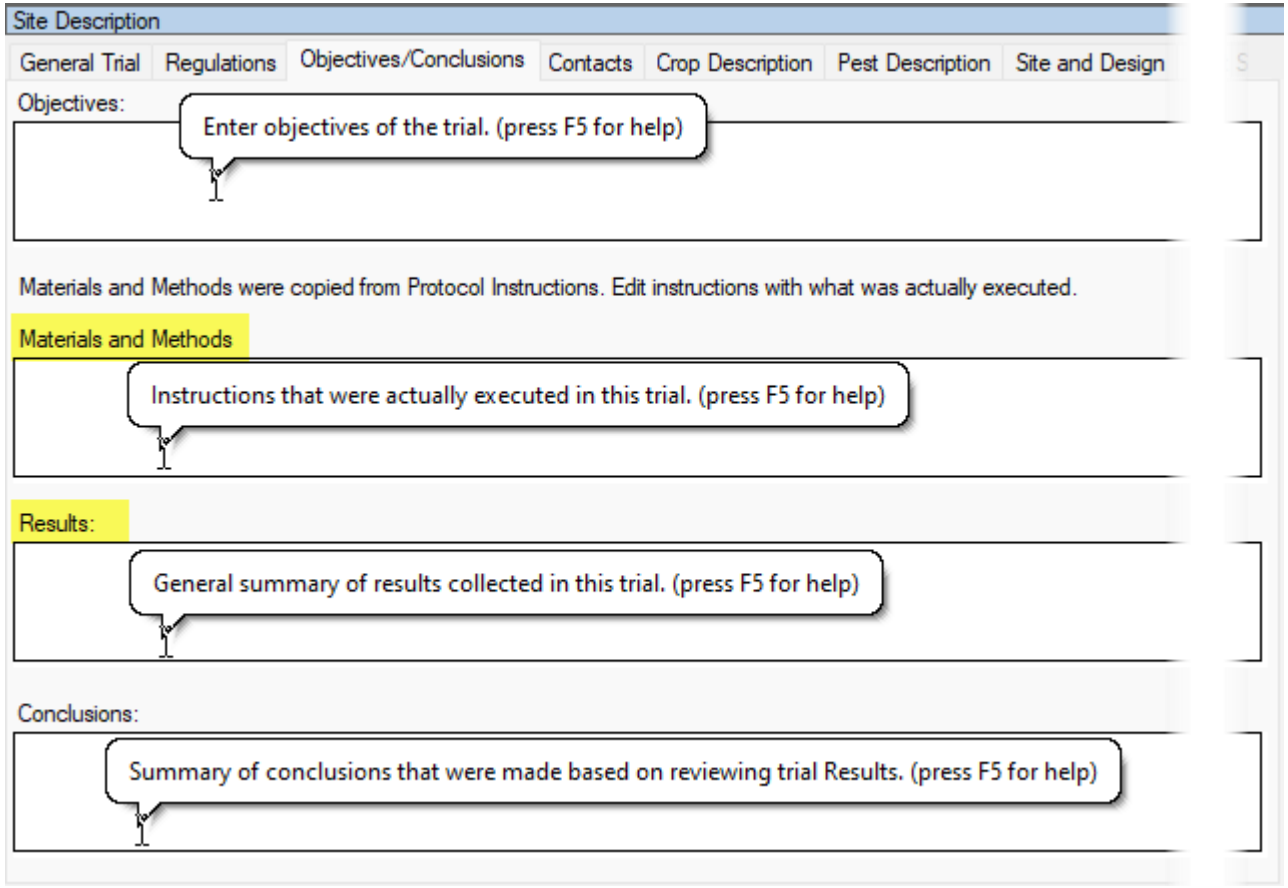
Objectives/Conclusions

Materials and Methods

- Pre-filled from Protocol Instructions
- Update for what actually occurred

Results

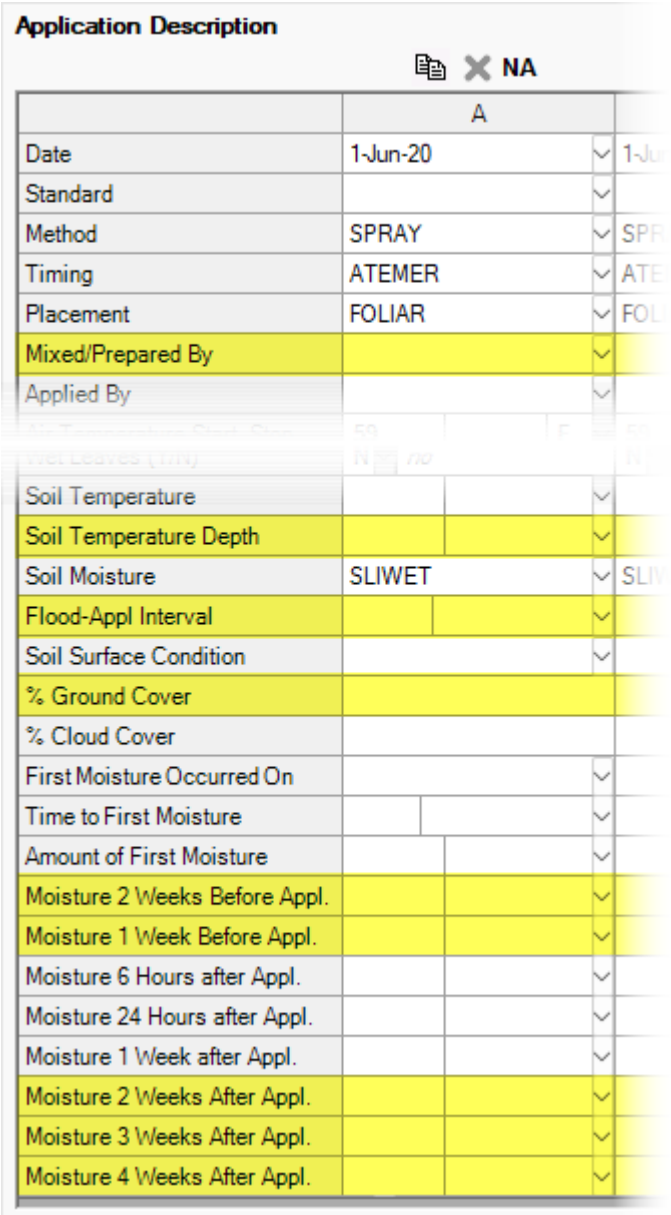
- A summary of the information collected in the trial
- Distinct from the Conclusions that are made from these results



Application Description

New Application fields for a trial:

- Mixed/Prepared By
- Soil Temperature Depth
- Flood-Appl Interval
- % Ground Cover
- Moisture 2 Weeks Before Appl
- Moisture 1 Week Before Appl
- Moisture 2 Weeks After Appl
- Moisture 3 Weeks After Appl
- Moisture 4 Weeks After Appl



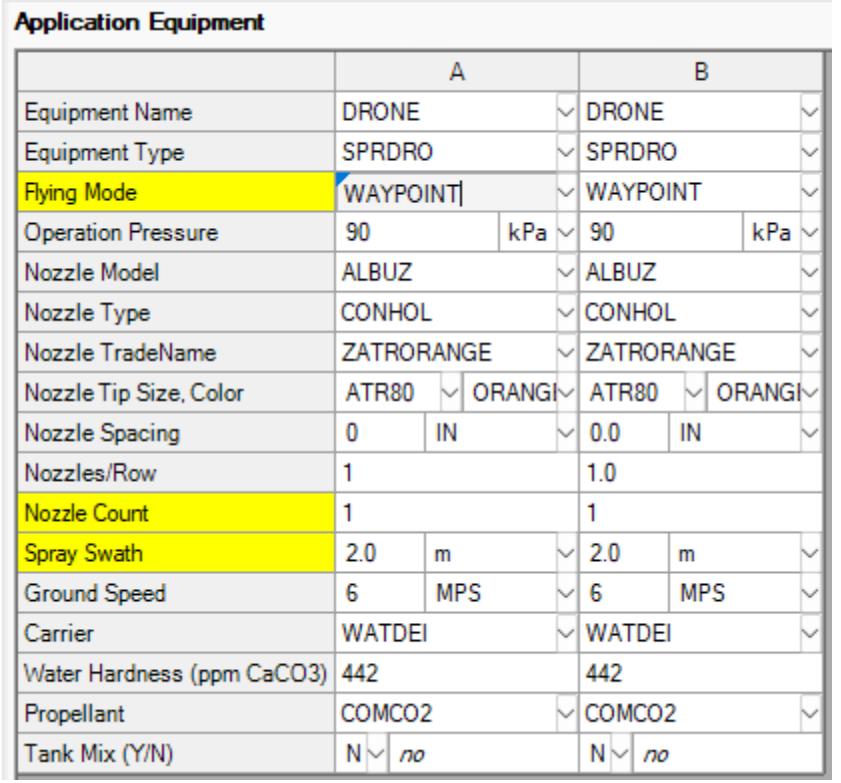
Application Equipment

New fields improve **drone** application documentation:

- Flying Mode
- Spray Swath

Protocol: Application tab

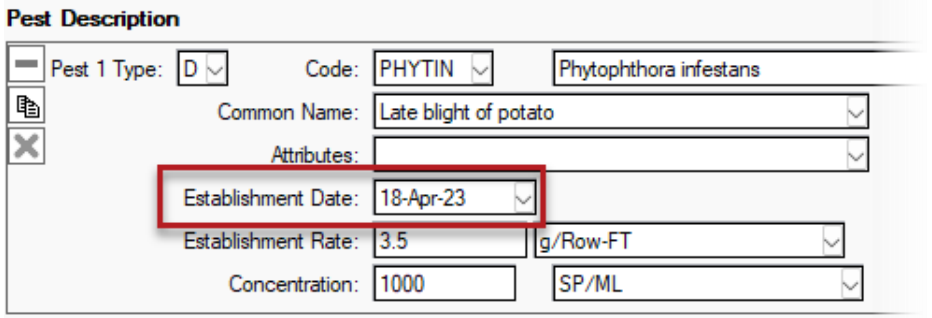
Trial: Application Equipment tab



Application Equipment

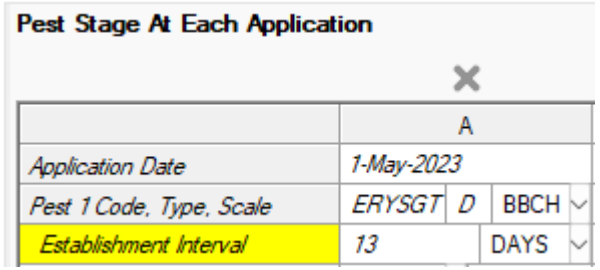
	A		B	
Equipment Name	DRONE		DRONE	
Equipment Type	SPRDRO		SPRDRO	
Flying Mode	WAYPOINT		WAYPOINT	
Operation Pressure	90	kPa	90	kPa
Nozzle Model	ALBUZ		ALBUZ	
Nozzle Type	CONHOL		CONHOL	
Nozzle TradeName	ZATRORANGE		ZATRORANGE	
Nozzle Tip Size, Color	ATR80	ORANGI	ATR80	ORANGI
Nozzle Spacing	0	IN	0.0	IN
Nozzles/Row	1		1.0	
Nozzle Count	1		1	
Spray Swath	2.0	m	2.0	m
Ground Speed	6	MPS	6	MPS
Carrier	WATDEI		WATDEI	
Water Hardness (ppm CaCO3)	442		442	
Propellant	COMCO2		COMCO2	
Tank Mix (Y/N)	N	*no*	N	*no*

Pest Establish. Intervals



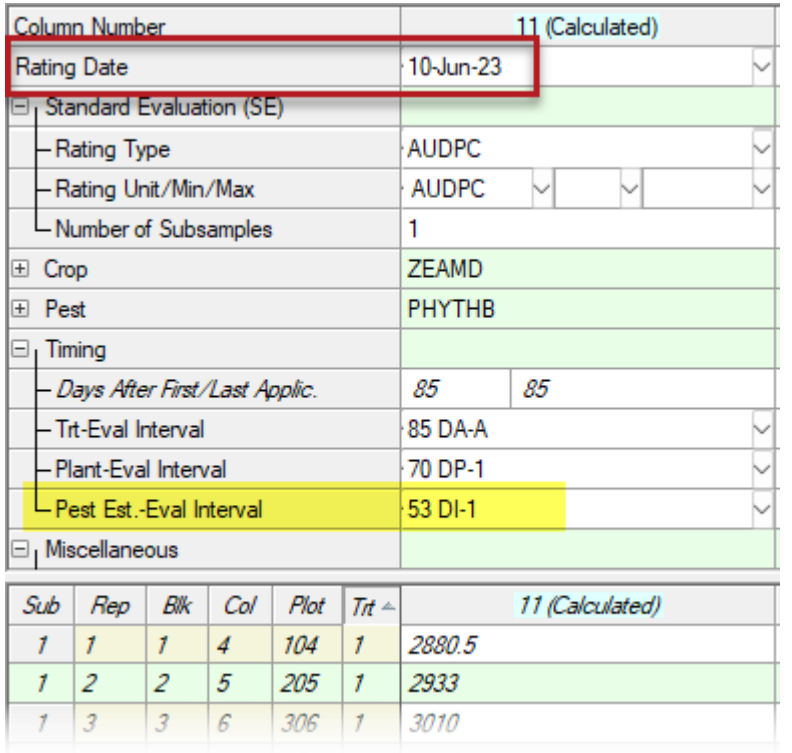
Pest Stage at Appl. > **Establishment Interval**

Amount of time between pest establishment and application date



Assessment > **Pest Est.-Eval Interval**

Amount of time between pest establishment and rating date



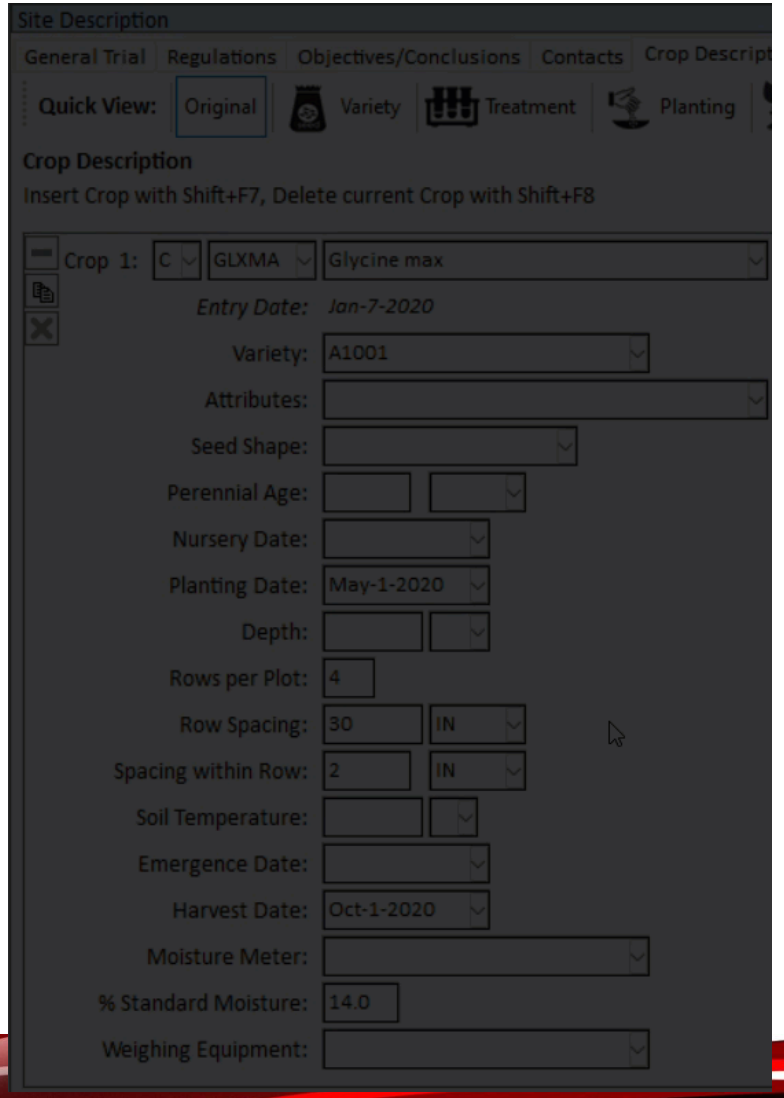
Linked Unit Fields

Linked related unit fields:

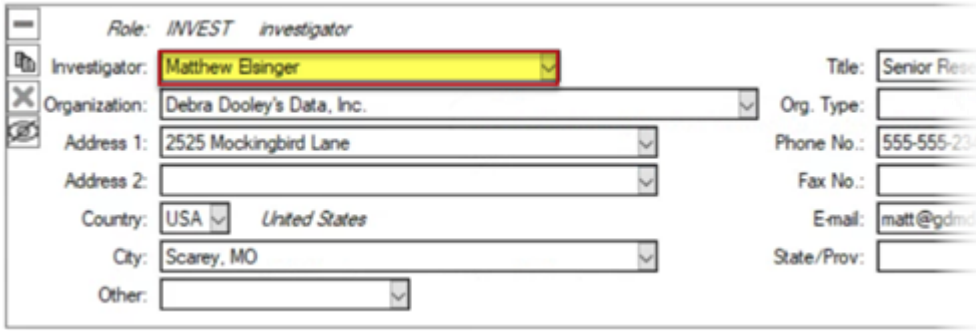
- Changing unit in one field automatically changes unit in linked field
- Value automatically adjusted to new unit

Which fields are linked? Fields where two separate value/unit pairs should always use the same unit, such as:

- Crop Description – Row Spacing and Spacing Within Row fields
- Total Plot Width and Total Plot Length fields
- Crop Stage at Appl – Crop Height, Total Canopy Height, and Treated Canopy Height fields

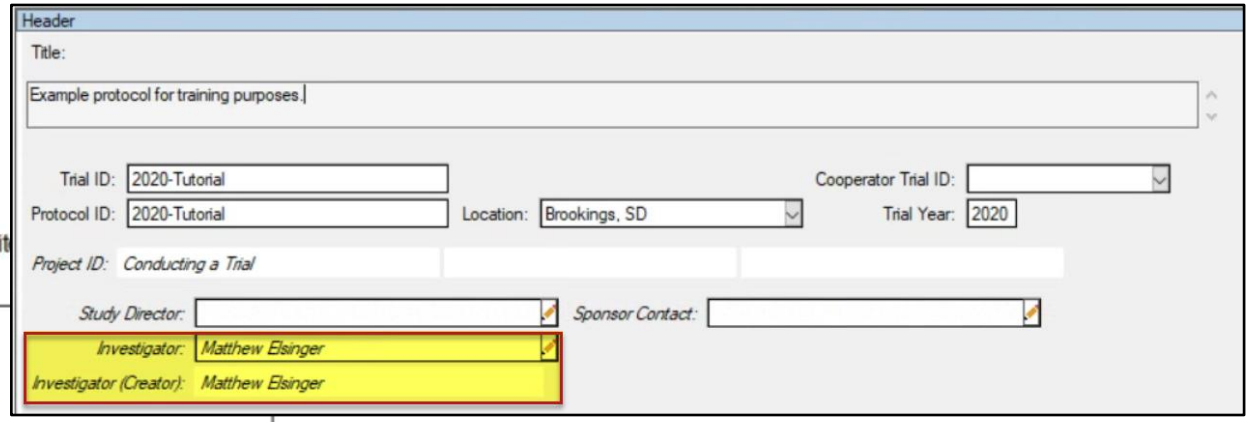


Header



'Investigator' field added to general study Header

- Automatically fills from Contacts
- Prints on all reports



New validation list items

New options related to bee research:

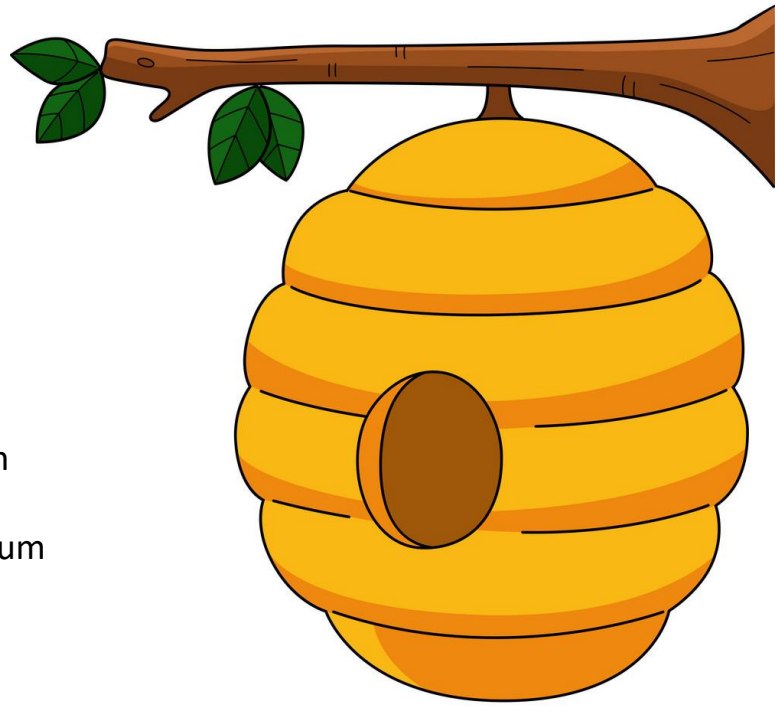
Formulation Type:

- SR – a solid strip of plastic (or other inert material) with active ingredient already applied.

Rate Units:

- Strips/Brood Chamber - Strips per brood chamber
- Pouches/Hive - Pouches per Hive
- mL/Hive - Milliliters Product per Hive
- g AI/Hive - Grams Active Ingredient per Hive
- ng AI/uL - Nanograms active ingredient per microliter mix
- ng AI/mL - Nanograms active ingredient per milliliter mix
- mg AI/mL - Milligrams active ingredient per milliliter mix

New validation list items



New options related to bee research:

Crop:
- HVE - Bee Hive (in non-taxonomic list)

Application method:
- POUCH - pouch or bag

Application timing:
- POHVSP - After Hive Split
- PONWEL - After New Queen Egg Laying
- EGH50 - eggs 50% hatched

Application Placement:
- HIVE - bee hive
- HIVET - bee hive, top
- HIVEM - bee hive, middle
- HIVEB - bee hive, bottom

Equipment Type:
- SPRBOT - spray bottle

Part Rated:
- HVBXDE | hive box – deep
- HVBXMD | hive box – medium
- FRBEDE | bee frame – deep
- FRBEMD | bee frame – medium
- FRBRDE | brood frame – deep
- FRBRMD | brood frame – medium
- BROODO | brood – open
- BROODC | brood – capped

Rating Type:
- Missing - missing or not found

Rating Unit:
- 0-30 | 0-30 index/scale | INDEX

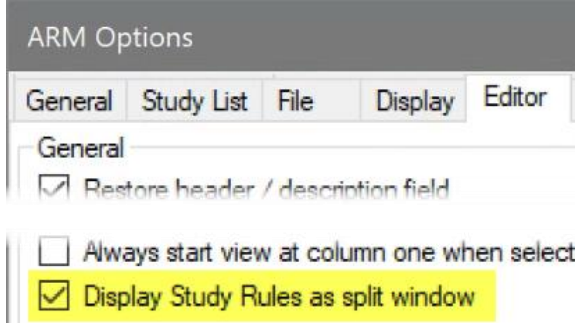
Collection Basis Unit:
- HIVE - bee hive

Sample Size Unit:
- HIVE - bee hive

Reporting Basis Unit:
- HIVE - bee hive

Settings

Study Rules window



Updated editor option: “Display Study Rules as split window”

Now: Displays rules editor on lower half when rules are added from a different screen

Examples:

- Load an SE that contains Study Rules
- Merge from Study
- Right-click > Load Rule Set