

In this video...

- How to validate the trial
- Study Rules
- Importance of validation



Assessment Data - Line 3	1	2	3	4
Column Number				
Plot Type	W	W	W	W
Plot Name	Palmer amaranth	Palmer amaranth	Palmer amaranth	Palmer amaranth
Crop Type, Code	C	C	C	C
Crop Name	Soybean	Soybean	Soybean	Soybean
Description	Plot Stand Count	Crop Phygen - 1 Day	% Control - 1 week	Raw Grain Wgt
Rating Date		Oct-3-2019		
Plot Rated	PLANT	PLANT	PLANT	GRAIN
Rating Type	COUPLA	PHYGEN	CONTRD	WEIGHT
Rating Unit	PLANT	%	%	KG
Sample Size	1 PLOT	1 PLOT	1 PLOT	1 PLOT

Plot	Rep	Plot	Col	Row	1	2	3	4
1	1	1	1	1	0	10		
1	1	2	1	2	12	0	20	
1	2	1	3	1	12	0	30	
1	2	1	4	1	0	0	40	
1	3	1	5	1	0	0	50	
1	3	1	6	1	100	0	60	
1	1	2	1	2	0	0	2	
1	1	2	2	2	0	0	4	

ARM validation actively verifies or checks that information entered in a trial is consistent and complete. This is a helpful tool to quickly double-check trial data and catch simple mistakes before sharing with others.

We will introduce the validation process, discuss study rules and their role in validation, and explain the importance of validating trials.

To follow along with this video, open the Tutorial trial 'ValidateYourTrial'. We are picking up where we left off in the last video, having entered the assessment data (even if our example data is not realistic or complete...). Let's say that data entry is finished, and we are ready to submit interim trial results to a sponsor as an in-season update. Before we send the file, we need to *validate* it.

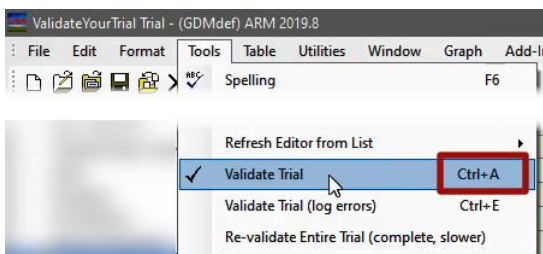
## Validation

- Refresh automatic entry fields
- Cross-checks (unit + value, dates)
- Verify rules
  - study definition
  - user-defined (Study Rules)



ARM validation is a process that inspects the information entered in the study. Specifically, ARM:

- Refreshes & re-calculates automatic entry fields,
- Performs cross-checks of unit-value pairs and date references, and
- Verifies that all rules are satisfied. These rules can come from the study definition itself, as well as user-defined rules listed on the Study Rules editor.



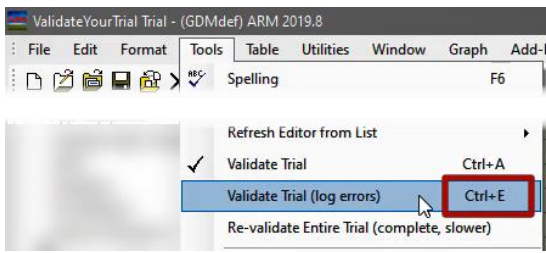
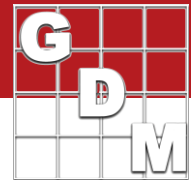
Let's return to the study, where we will see examples of these in action.

To perform study validation, select Tools > Validate Trial (or use the keyboard shortcut Ctrl-A). As soon as ARM encounters an issue with the study, it stops and provides a message about the problem.

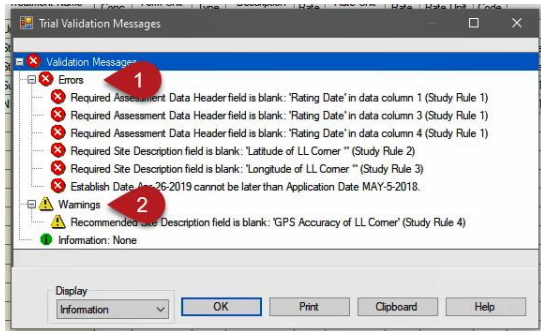
Tit Line No.	Type	Treatment Name	Form Conc	Form Unit	Form Type	Description	Rate	Rate Unit
1	CHK	Untreated Check				not treated		
2	HERB	Stomper Plus	400	gA/L	EC		3	kg Al/ha
3	HERB	Stomper Plus	400	gA/L	EC		3.5	kg Al/ha
4	HERB	Super Stomp	75	%AW/W	DF		375	g Al/ha
5	ADJ	NIS		%	SL		0.5	% V/V
6								

This time it says the Formulation Concentration value is blank in treatment line 5. Then we are automatically taken to the field in question, where we can see that we had a unit specified but did not fill in a value.

# Validate Your ARM Trial



Once we fix this error, we could press Ctrl+A to validate again and move to the next issue. There is another option for validation: Tools > Validate Trial (log errors), or Ctrl+E. The difference here is that ARM does not stop when it finds an error, but instead goes through all the procedures and provides a list of all the issues found.

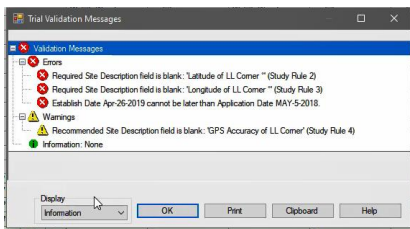


This list is broken up into *Errors*, which prevent the trial from being considered valid. *Warnings* allow the trial to pass validation, but are still displayed to provide notification to the trialist.

We can see that the Form Concentration error has been fixed, but we still have some work to do.

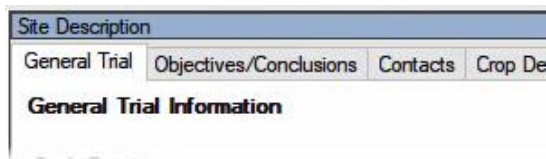
Rule	Rule ID	Editor	Field	Condition	Columns/Tit Lines
1	Required	Assessment Data	Rating Date	With assessment data	All
2					
3					
4					

The first errors indicate that we forgot to fill in the Rating Date when we entered data. Note that this generated a validation error because of Study Rule number 1, which we can view on the Study Rules editor. Here we can see that it is required that the Rating Date be filled in, at the time that assessment data is entered. This rule applies to all assessment columns (although a particular subset could have been chosen when adding the rule).

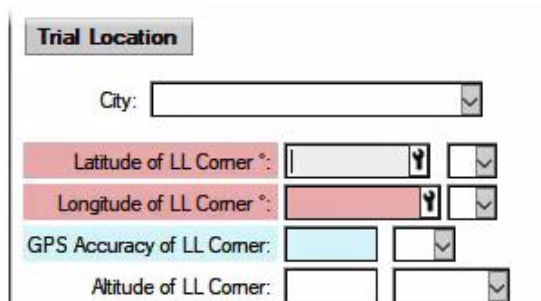


Let's go back to the assessment editor and fix this issue.

Once all of the dates have been filled in, re-validate to see that the list is now shorter.

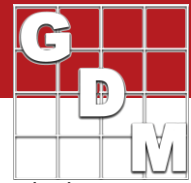


The next error is in the Site Description, so let's use Ctrl+A to find the field quickly. We are taken to the General Trial tab, where there are 3 fields highlighted. The red color indicates a Required study rule, which triggers an Error when validating. The light blue indicates a *Recommended* study rule, which only provides a warning if the rule is not met.



(You can customize these colors in the Display options.)

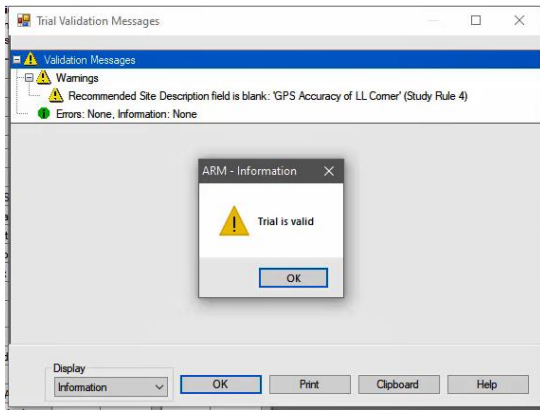
Fill in the Latitude and Longitude values, to satisfy the required study rules 2 and 3. We will come back to the Accuracy field, so leave that blank for now.



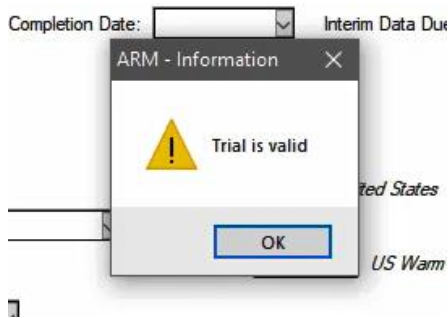
Site Description		
General Trial	Objectives/Conclusions	Contacts
<b>Application Description</b> Insert Application with Shift+F7, Delete current Application with Shift+F8 Appl. Code in Treatments links with Application Codes (A,B,...) below		
Application Date	A May-5-2018	B May-5-2019
Appl. Start Time		

The final validation error is an example of a cross-check coming from the study definition, which ARM performs without any user-defined study rule in place. ARM noticed that the trial initiation date is later than one of the application dates, which is not valid.

Looking at the Application information, the issue is that we typed the wrong year into Application A.



That takes care of the last validation error. Now when we validate again, two windows appear. ARM confirms that the trial now passes validation, but also lists warnings still present in the trial. This warning refers to the recommended entry field for GPS accuracy from earlier.



If we fill this in and re-validate, now there are no warnings or errors to show, just the confirmation of validity.

## Validate Often!

Validate after each session with a trial



Frequent checks => incremental fixes

Always ready for sharing



This may seem like a long process to complete, but this example was crafted to cover several different scenarios. We recommend starting the habit of validating each trial after making changes, for a couple of reasons.

- First, validation covers the changes made to the file since the last validation occurred. When validation is performed frequently, only the incremental changes are involved and will be resolved quickly.
- Second, you will always have a trial that can be shared at a moment's notice. If the trial sponsor requests interim results, or you need to present or share the file with somebody else, you can be sure that the file is validated and ready to be shared!