



# GDM Products Update Apr. 2018

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Gylling Data Management (GDM) creates, markets and supports ARM software for managing and summarizing agriculture research experiments.

## Software SOLUTION for planned efficacy experiments from start to finish

- ARM: plan, create, manage, analyze, and report experiments
- ST: analyze across multiple experiments
- TDC: collect, verify, analyze data on tablet
- ATD: organize, store experiments in SQL server database

- See [GDM Overview New! \(mp4\)](#) on [gdmdata.com](http://gdmdata.com) for information about GDM and our products, and [Trial Management Software Features \(pdf\)](#) for an overview of features our software provides.



## ARM version 2018 is now available!

ARM version 2018 is now available for free through the Check for Updates with an up-to-date paid annual maintenance license. See [ARM 2018 Features](#) for a list of features added in ARM 2018.

## ARM connects with Iteris ClearAg weather data

Iteris ClearAg weather content is now available by subscription to GDM clients. Directly import ClearAg's **historical** and **current weather information** and **soil data** from around the world through ARM software.



Request more information about ClearAg at: <http://info.clearag.com/ARMinfo.html>

## Introducing TDCx – **new** ARM license add-in

TDCx is a new ARM add-in that includes Tablet Data Collector (TDC) software for:

- An activated ARM license serial number – TDCx installs onto the same computer as ARM
- That is installed only once on either your touch-enabled Windows tablet, or a laptop computer.

The "x" in "TDCx" indicates that you:

1. Purchase a touch-enabled Windows tablet or laptop computer of your choice, then
2. Install and activate your ARM license on this computer - either:
  - a. Transfer your current ARM license to this computer and purchase the TDCx Add-In, or
  - b. Purchase an ARM Field license which is an ARM Technician license plus TDCx Add-In.

See [ARM Tablet Data Collector \(TDCx\)](#) for more information.

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# New ARM Features in ARM 2018

## 1. Integrated Weather Data

- Import current or historical weather data based on geo location
- Batch imports function allows for efficiently integrating weather data for past trials

No.	Date	Time	Irrigation	Unit	Precipitation	Unit	Irr+Precip	Unit	Type	Min Temp	Max Temp	Avg Temp	Temp Unit	% Relative Humidity	Unit
1.	4/19/2017		5.0	mm	0.0	mm	5.0	mm	TOTAL	-1.0	8.0	4.0	C	61.0	1.0
2.	4/20/2017				0.12	mm	0.12	mm	RAIN	-2.0	11.0	5.0	C	53.0	1.0
3.	4/21/2017				0.0	mm	0.0	mm	RAIN	3.0	13.0	9.0	C	64.0	1.0
161.	9/26/2017				0.0	mm	0.0	mm	RAIN	9.0	19.0	14.0	C	86.0	2.0
162.	9/27/2017				0.05	mm	0.05	mm	RAIN	9.0	19.0	14.0	C	86.0	2.0
163.	9/28/2017				0.47	mm	0.47	mm	RAIN	14.0	19.0	16.0	C	86.0	8.0
164.	9/29/2017				1.57	mm	1.57	mm	RAIN	14.0	23.0	18.0	C	84.0	7.0

**Weather Import**

Application: Items ClearAg

Import weather data to blank weather fields

Import daily weather data for specified date range

From: Apr-15-2017

To: Aug-7-2017

Options

Import daily weather data prior to starting date 14 days

Import daily weather data after ending date 1 days

Import missing application weather data for dates within last 2 years

Measurement unit:  Metric  US standard

Settings...
OK
Cancel
Help

**Mix Size Calculator - Application A**

Application volume: 200 L/ha

Mix Size

Treatments	1
Replicates	4
'Plot' EU size	38.75 m2
Application volume	200 L/ha
Mix size unit	liters
Minimum	3.1 liters
Overage	<span style="border: 1px solid gray; padding: 2px;">450</span> mL
Calculated mix size:	3.55 liters
User-defined mix size:	<span style="border: 1px solid gray; padding: 2px;">3.6</span> liters

OK
Cancel

Mix Size, Unit: 3.6 liters

## 2. Mix Size Calculator tool

- Calculate mix size based on current application settings by pressing the Tool button in Mix Size field to open this dialog
- Define overage (mL or %) in ARM so can better calculate product amounts

**Application Plan**

Selected Applications	<input checked="" type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D	<input type="checkbox"/> E	<input type="checkbox"/> F
<b>Settings</b>						
Treated Plot Width	3.1 m	3.1 m	3.1 m	3.1 m	3.1 m	3.1 m
Treated Plot Length	12.5 m	12.5 m	12.5 m	12.5 m	12.5 m	12.5 m
Replications	4	4	4	4	4	4
<b>Crop Information</b>						
Crop	MABSD	MABSD	MABSD	MABSD	MABSD	MABSD
Row Spacing, Unit	3.10 M	3.10 M	3.10 M	3.10 M	3.10 M	3.10 M
Rows per Plot	2	2	2	2	2	2
Treated Canopy Height, Unit	2.5 m	2.5 m	2.5 m	2.5 m	2.5 m	2.5 m
Total Canopy Height, Unit						
Treated Leaf Wall Area, Unit	12903 m2/ha	16129 m2/ha	16129 m2/ha	16129 m2/ha	16129 m2/ha	16129 m2/ha
Treated Leaf Wall Area per Plot, Unit	50 m2/plot	63 m2/plot	63 m2/plot	63 m2/plot	63 m2/plot	63 m2/plot
<b>Application Information</b>						
Application Date	Apr-23-2014	Apr-12-2014	Apr-23-2014	May-3-2014	May-12-2014	May-21-2014
Row Sides Applied	2	2	2	2	2	2
Spray Volume, Unit	200 L/ha	200 L/ha	200 L/ha	200 L/ha	200 L/ha	200 L/ha
Mix Overage, Unit	450 mL	450 mL	450 mL	450 mL	450 mL	450 mL
Calculated Mix Size, Unit	3.55 liters	3.55 liters	3.55 liters	3.55 liters	3.55 liters	3.55 liters
Mix Size, Unit	3.6 liters	3.9 liters	3.5 liters	3.5 liters	3.5 liters	3.5 liters

Tt Line	Tt No.	Type	Treatment Name	Form Conc	Form Unit	Form Type	Specific Gravity	TGW g/100	Rate	Rate Unit	Other Rate	Other Rate Unit	Min # Appl	Appl Code	Crop ID Number
2	2	FUNG	Cyprodinil	750	G/KG	WG			0.20	kg/10000 m2 LWA				A-1	
3	3	FUNG	Cyprodinil	750	G/KG	WG			0.30	kg/10000 m2 LWA				A-1	
4	4	FUNG	Dodine 544 SC	200	G/L	SC			0.05	L/ha/m CH				A-1	
5	5	FUNG	Syllit							L/10000 m2 LWA				A-1	
6	6	FUNG	Syllit							L/10000 m2 LWA				A-1	
7	7	FUNG	Cyprodinil							kg/10000 m2 LWA				A-1	
8	8	FUNG	Cyprodinil	750	G/KG	WG			0.75	kg/10000 m2 LWA				A-1	
9	9	FUNG	Syllit	400	G/L	SC			1.15	L/ha				A-1	
10	10	FUNG	Syllit	400	G/L	SC			1.5	L/ha				A-1	
11	11	FUNG	Cyprodinil	750	G/KG	WG			0.20	kg/ha				A-1	
12	12	FUNG	Cyprodinil	750	G/KG	WG			0.30	kg/ha				A-1	
15	15	CHK	Untreated											A-1	

Adjust mix size and product amounts for Treated Canopy Height when LWA Application Volume unit is selected and there is a calculated Leaf Wall Area

Identify entered Mix Sizes that are different from Calculated Mix Size +/- 5.0 %

Help
Cancel
Next

## 3. Application Plan:

- Display all fields necessary for mix size and leaf wall area (LWA) calculations
- Opens from:
  - Treatments editor
  - Protocol/Site Description editor
  - Spray/Seeding Plan report

## 4. Mix Size for Leaf Wall Area

**Mix Size Calculator - Application A**

Application volume: 200 L/10000 m2 LWA

Mix Size

for Application	A
Treatments	1
Replicates	4
'Plot' EU size	38.75 m2
Application volume	200 L/10000 m2 LWA
Mix size unit	liters
Minimum	4 L/200 m2 LWA
Overage	<span style="border: 1px solid gray; padding: 2px;">450</span> mL
Calculated mix size:	4.45 L/200 m2 LWA
User-defined mix size:	<span style="border: 1px solid gray; padding: 2px;">4.5</span> liters

OK
Cancel

- Enter Mix Size as **total mix** for LWA and Canopy Height treatments

- Previously was entered as mix per 10000 m2 LWA, or per 1 meter canopy height

## 5. Spray/Seeding Plan report

- Include Treated Leaf Wall Area Per Plot, when applicable
- Include amount of mix coverage, when defined in the study
- Option to include Diluent quantity for liquid treatments

Reps: 4 Appl Code: A Plots: 3.1 by 12.5 meters Treated Leaf Wall Area per Plot, Unit: 50 m<sup>2</sup>/plot  
 Spray vol: 200 L/ha Mix Size: 3.5 L/12903 m<sup>2</sup> LWA (total for 4 plots, includes 450 mL coverage)

Trt No.	Treatment Name	Form Conc	Form Type	Rate Unit	Amt Product to Measure	Diluent	Rep 1	Rep 2	Rep 3	Rep 4
2	Cyprodinil	750 WG	0.20 kg/10000 m <sup>2</sup> lwa	3.5 g/mx	3496.5 mL	102	206	312	408	
3	Cyprodinil	750 WG	0.30 kg/10000 m <sup>2</sup> lwa	5.25 g/mx	3494.8 mL	101	204	308	401	
4	Dodine 544 SC	544 SC	0.85 l/ha/m ch	14.88 mL/mx	3485.1 mL	106	209	307	412	
5	Syllit	400 SC	2.88 l/10000 m <sup>2</sup> lwa	50.4 mL/mx	3449.6 mL	108	211	302	405	
6	Syllit	400 SC	3.75 l/10000 m <sup>2</sup> lwa	65.63 mL/mx	3434.4 mL	111	203	310	402	

**AOV Means Table Report Options**

Descriptive statistics

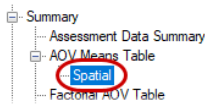
- LSD (or HSD if Tukey's)
- Standard deviation
- Coefficient of variation (CV)
- Grand mean
- Homogeneity of variance test (Levene's)
- Friedman's method for randomized blocks (Levene's)
- Skewness (Bartlett's)
- Kurtosis

	1	2	3	4
LSD P = .05				
Standard Deviation	0.821	18.305	1.686	14.544
CV	32.76	40.77	54.39	24.75
Levene's F	1.153	1.352	3.29	0.856
Levene's Prob(F)	0.37	0.297	0.04*	0.512
Skewness	0.4943	-0.4657	1.8499*	-0.8631
Kurtosis	-0.8027	-1.0584	2.6407*	-0.9292

## 6. AOV Means Table report

- Perform the **Levene's test** for homogeneity of variance
  - Printed as a descriptive statistic
  - Levene's test is less sensitive to departures from normality than Bartlett's test, so is generally preferred

- **Spatial analysis** attempts to recover information about hidden variables across a field



**AOV - Spatial Report Options**

Report options: AOV Means Table | General Summary | Report Preview

Spatial Method: Automatic

Mean comparison test: LSD

Descriptive statistics

- Spatial AIC

- *Trend analysis* - analyze pattern covering whole field
- *Nearest Neighbor analysis* - analyze effects only in space adjacent to individual plots
- *Automatic* – ARM will select best-performing model



## 7. Spatially balance treatment randomization

- For RCB designs, use a randomization optimized to uniformly disperse treatments across the trial
- Balances average distance between all treatment pairs across replicates (see Trial Map – Quality tab)

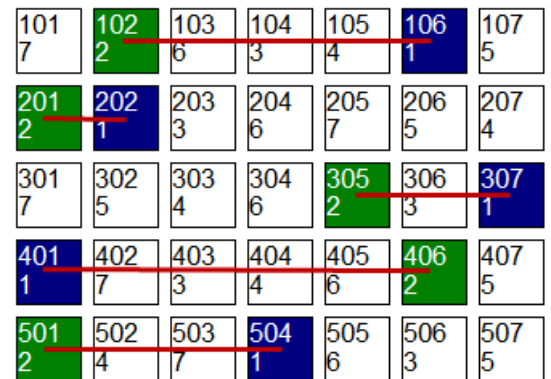
**Protocol Settings**

General | Design | Treatment | Application | Layout

Randomised Complete Block (RCB)

Extended design settings

- Spatially balance treatments (for maximum 100 treatments and 20 replicates)



The latest changes to ARM are always on our website [gdmdata.com/Products/ARM/Updates/Release\\_Notes](http://gdmdata.com/Products/ARM/Updates/Release_Notes)

# ARM Tablet Data Collector (TDCx)

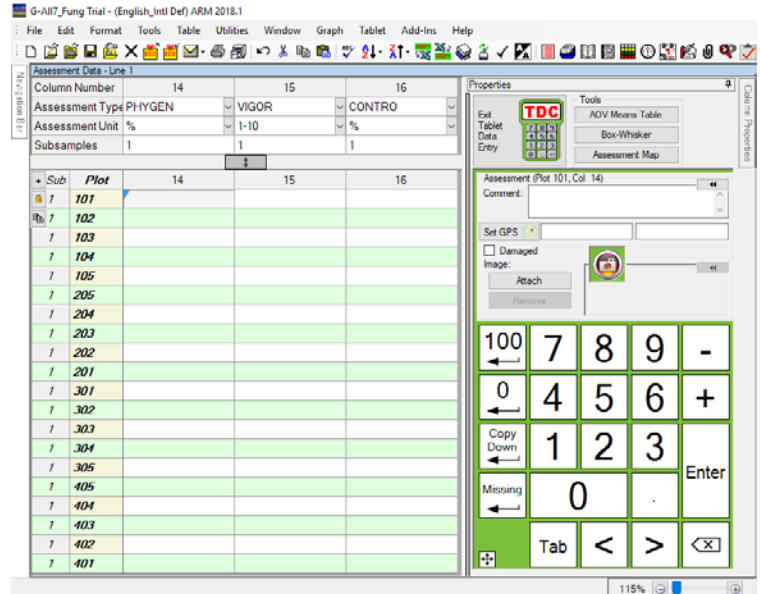


TDCx is the new ARM add-in that adds **Tablet Data Collector (TDC)** features to an ARM license installed on a touch-enabled computer of your choice ("x"). Use TDC to record all trial information at the trial site directly into the actual ARM trial.

At left is "Tablet Data Entry" mode, to directly enter assessment and other trial information on-site.

Features include:

- Integrated touch keypad (with size adjustment).
- Optimized for data entry:
  - Single keypress actions.
  - Enter multiple assessments at one time.
  - Data limits using action codes.
- Take plot photos directly into ARM trial entries and rename picture files to associate with plot.
- Record GPS of plots and trial corners.
- Auto-save and backup data after each plot.
- Enter all trial site details, even summary and conclusions.
- Perform immediate data quality checks on-site:
  - Heat-map of assessment values.
  - Check for outliers.
  - Box-whisker graph.
  - Full statistical analysis.



You will benefit from using full ARM plus special data entry and review features that are only available on ARM Tablet Data Collector. For details, see [gdmdata.com/Products/Tablet Data Collector \(TDC\)](http://gdmdata.com/Products/Tablet Data Collector (TDC)).

**Newest TDC Features:** Audible verification of key press, display Windows keyboard when entering assessment columns to assess, and improved panel resizing.

# ARM Summary Across Trials (ST)

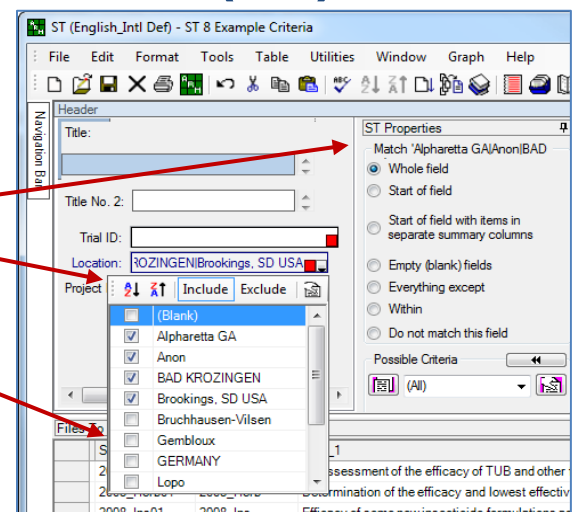


**ARM ST (Summary Across Trials)** is an add-in to an installed ARM program.

ST Properties panel shows the choices for matching selections that you enter to identify trials which should be included in the multi-trial summary.

A simple Excel-like interface makes it easy to review and choose trials using the familiar ARM trial data entry windows and fields.

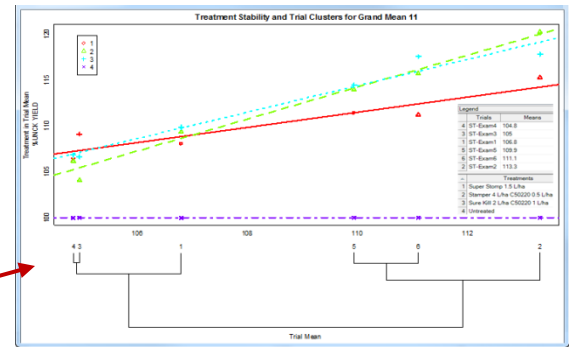
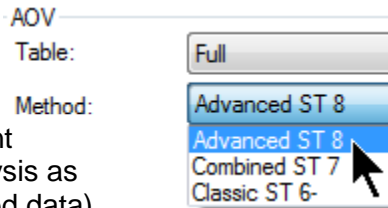
The list of currently selected trials displays on each study editor as match information is defined or changed.



'Advanced ST 8' analysis method uses the R statistics tool to give an accurate, statistically adjusted analysis of trials with missing data or different number of replicates (same analysis as SAS® GLM for normally distributed data).

The correct analysis method is automatically selected according to the experimental design of each summarized trial.

Treatments \* Trial graph helps identify location groups:



For details, see [gdmdata.com/Products/Summary Across Trials \(ST\)](http://gdmdata.com/Products/Summary Across Trials (ST)).

## ARM Trial Database (ATD)



ARM TD is a relational database for storing and retrieving trials based on standard "GDMdef" ARM study definitions. ARM directly exports and imports trials in the database, and Microsoft Office™ products can be used to build customized reports for trials extracted from the database.

The trial database can centralize storage and retrieval of long-term trials, giving additional protection against losing unique trial information because of a computer hard drive failure. ST also connects directly to ATD, providing enhanced query and selection features for multi-trial summaries.

For details, see [gdmdata.com/Products/Trial Database \(ATD\)](http://gdmdata.com/Products/Trial Database (ATD)).

Contact GDM for information on pricing and availability using "[Write to Us](#)" on [gdmdata.com](http://gdmdata.com).

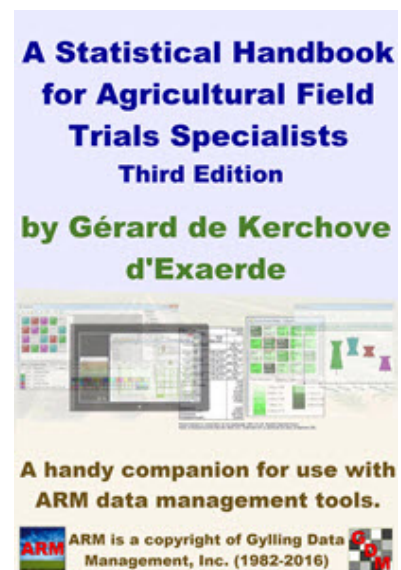
## Statistical Handbook, Third Edition

In 2016 Gerard de Kerchove (author) and Andrew Norton of PDM Associates (editor) published the 3rd Edition of their very popular book **A Statistical Handbook for Agricultural Field Trials Specialists**. The handbook is updated with all screenshots and figures in color, as well as formatting improvements for e-book.

The statistical handbook uses a logical and understandable way to describe the basic statistical elements affecting field trials and their planning, implementation, and interpretation. The book is designed to be suitable for:

- Field Trials Specialists,
- Project Managers who may be interpreting results,
- and also for students who may be taking their first opportunity to get involved in this type of experimentation.

See [Statistical Handbook - Table of Contents \(pdf\)](#) for an overview of the Table of Contents, listing the different topics.



To order the e-book or printed version of the handbook (3rd Edition), purchase from:

Amazon - <https://www.amazon.com/Statistical-Handbook-Agricultural-Trials-Specialists-ebook/dp/B01KIHJRWQ/>

Kobo - <https://store.kobobooks.com/en-us/ebook/a-statistical-handbook-for-agricultural-field-trials-specialists>

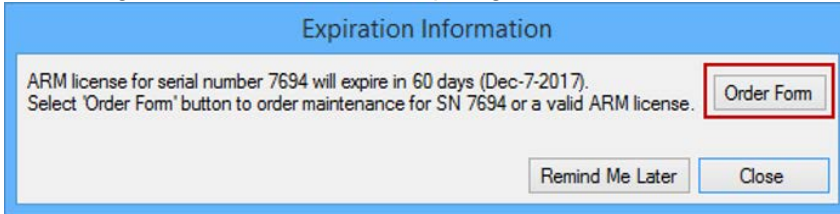
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# ARM Maintenance Renewal

ARM includes a software maintenance plan. Key maintenance benefits are:

- All new software features are immediately available, delivered in the next update.
- Software updates and upgrades are delivered for free (including **ARM 2018!**).
- Regardless of when you purchase ARM or ST, you receive all the newest software enhancements.

View your Maintenance Expiration date from Help – About ARM dialog. When <60 days remain, ARM will give a warning that maintenance is expiring soon.



Select 'Order Form' to display maintenance invoice or request an updated invoice.

- Tech licenses should contact Full licensee to order maintenance.

For more information see [gdmdata.com/media/documents/ARM\\_Client\\_License\\_Maintenance\\_and\\_Renewal.pdf](http://gdmdata.com/media/documents/ARM_Client_License_Maintenance_and_Renewal.pdf)

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## Video: Getting Started with ARM



Learn the basics of the ARM program with our new video series [Getting Started with ARM](#). Topics range from describing the ARM window, to describing the most important program options and help features, to a beginner's look at the Study List tool and backup features.

This series is designed for those opening ARM for the first time, but can also be an excellent refresher for any ARM user!

Watch our latest tutorial videos, [Getting Started with ARM](#).

Or view all of our tutorial videos at <https://gdmdata.com/Resources/Video-Tutorials>.