



ARM Software Suite



Introduction



Kyle Kepner

Position: Chief Operating Officer

Experience:

- 2 Years South Dakota State University Crop Performance Testing
- 9 Years Assistant Corn Breeder, AgReliant Genetics
- 6 Years Product Manager Wensman Seed Company



Gylling Data Management, Inc.

Founded in 1982, Steve Gylling created the first version of what became the ARM software for managing agricultural research trials.

GDM Evolution

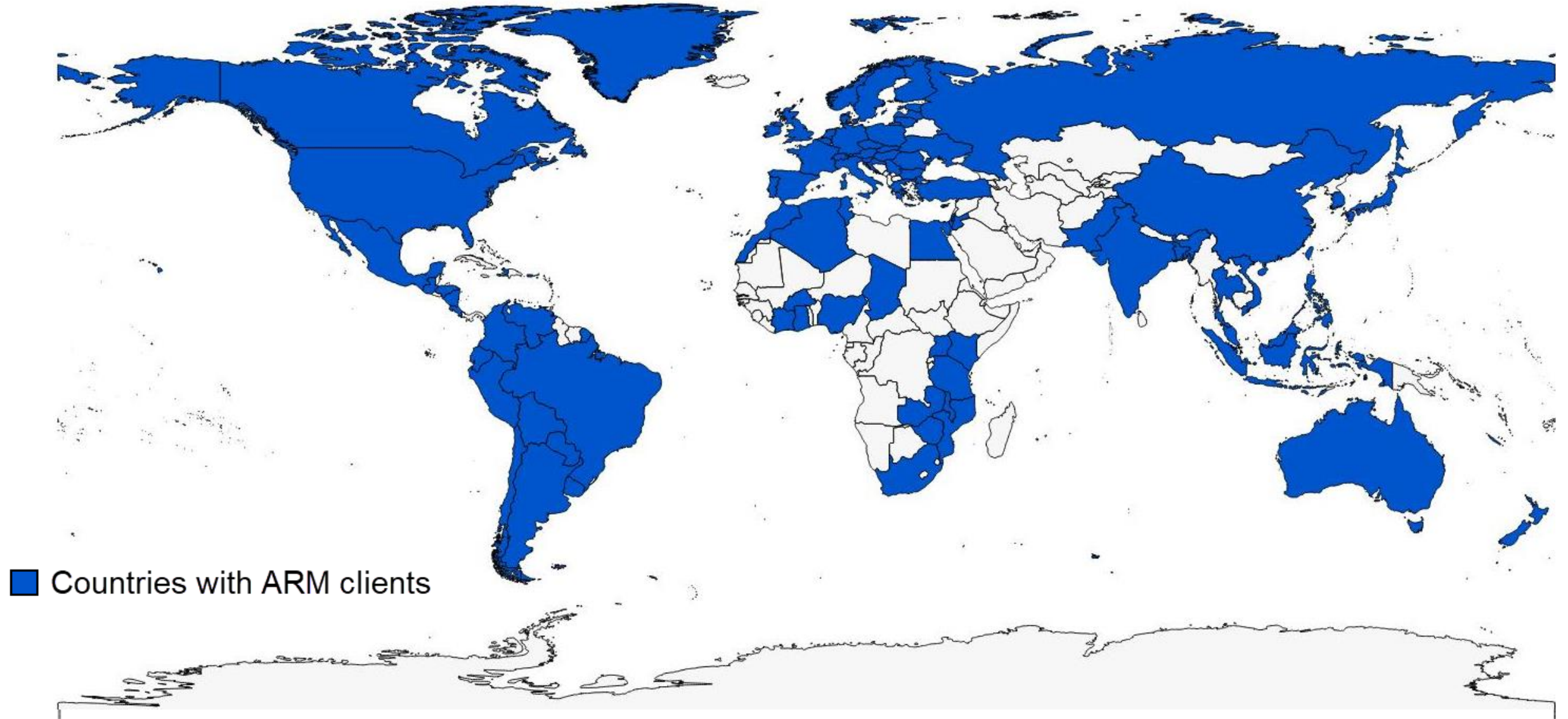
DOS to Windows, and

from **H**erbicide **R**esearch **M**anager, **P**esticide **R**esearch **M**anager, to **ARM**.



Herbicide **R**esearch **M**anager was first programmed on Radio Shack Model III 48 K

Country affiliation of ARM clients



Clients using GDM Software

> 200 university and government organizations

The world's top 12 global agro-chemical companies: Syngenta, Bayer, BASF, Dow, Monsanto, DuPont, Adama, Nufarm, FMC, Sumitomo, UPI/UPL,...

Additional manufacturers:

Chemtura, ISK Biosciences, Novozymes, Scotts, Sipcam, ...

> 100 Contract Research Organizations (CROs):

Eurofins, SGS, SynTech; Anadiag, Agrii, Biotek, Peracto, Staphyt, ...



ARM Facilitates to Better...

- Automate and guide for common tasks
- Visualize data, trials, and fields
- Simplify recommended and typical tasks and actions
- "Sophisticated" yet easy-to-use statistics
- Optimize quality and performance
- Remind to review, do, send, ...
- Support more types of research & trials

Why use ARM Software?

ARM is the software solution to plan, create, manage, analyze and report agricultural experiments

Power and Efficiency

CV 10.0 Reps 5 Power 80 aSL 5% % Mean Diff 10.0

Lock at

CV	Reps	Power	aSL	% Mean Diff	Error DF	Plot EUs
3.4	4				3	8
4.25	5				4	10
4.96	6				5	12
5.6	7				6	14
6	8	80	5%	10	7	16
6.64	9				8	18
8	13				12	26
10	18				17	36
12	25				24	50

Treatments - Line 1

Trt Line	Entry No.	Entry Name	Accession Number	Gem. %	TGW g/1000	Seeding Rate	Rate Unit	Other Rate
1	1	CHOICES SP5061	3024			76600	Seeds/ha	31000
2	2	JOHNSON FARMS 75D00	5018			76600	Seeds/ha	31000
3	3	JOHNSON FARMS 71B81	5022			76600	Seeds/ha	31000
4	4	STATE 4760 SSTAX RIB	13018			76600	Seeds/ha	31000
5	5	STATE 4551 SSTAX RIB	13019			76600	Seeds/ha	31000
6	6	STATE 4560 VT5P RIB	13026			76600	Seeds/ha	31000
7	7	STATE 4560 SSTAX RIB	13027			76600	Seeds/ha	31000
8	8	STATE 4760 VT5P RIB	13029			76600	Seeds/ha	31000
9	9	STATE 4770 VT5P RIB	13030			76600	Seeds/ha	31000

Trial Map

Properties

- Color by
 - Replicate
 - Treatment
 - Current Treatment
- Auto-select for move
- Replicate
- Treatment
- Plot Experimental Unit
- Auto delete blank columns and rows within map

Options Movement Arrows Treatment Description Comment Qua

Trt	Code	Description	Reset
1	CHK	Untreated Check	
2	Tub.5	Tub 0.5 L/ha	
3	Tub1	Tub 1 L/ha	
4	Tilt	Tilt 250 0.5 L/ha	
5	Mi/Fu	Mico 60 1.5 L/ha:Fungol 1.25 L/ha	

Assessment Map - Column 3 - SEPTTR

Color Description Options Treatment Description Ass

Color	Description	Options	Treatment Description	Ass
Light Green	0.50 to 0.95		3.2 to 3.65	
Medium Green	0.95 to 1.4		3.65 to 4.1	
Dark Green	1.40 to 1.85		4.10 to 4.55	
Very Dark Green	1.85 to 2.3		4.55 to 5.00	
Black	2.30 to 2.75			

Rating Type	Rating Unit	PESSEV
ARM Action Codes	%UNCK	TAB[7]
Trt Treatment No. Name	Rate Rate Unit	
1 Untreated Check		0.00 c
2 Tub	0.5 l/ha	88.74 ab
3 Tub	1 l/ha	95.62 a
4 Tilt 250	0.5 l/ha	85.11 ab
5 Mico 60 Fungol	1.5 l/ha 1.25 l/ha	74.09 b
LSD P=05		12.749
Standard Deviation		8.275
CV		12.04
Grand Mean		68.711
Bartlett's X2		6.963
P(Bartlett's X2)		0.073
Skewness		-1.3261*
Kurtosis		0.1148
Replicate F		2.117
Replicate Prob(F)		0.1514
Treatment F		89.729
Treatment Prob(F)		0.0001

Means followed by same letter or symbol do not differ significantly
Mean comparisons performed only when AOV is significant



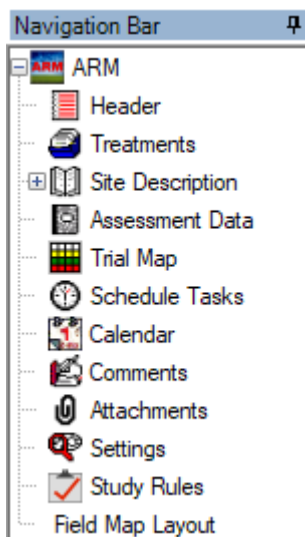
Why use ARM Software?

ARM provides:

- **Structure** for consistent information
- **Master Lists** to standardize vocabulary
- **Tools** for all phases of an experiment

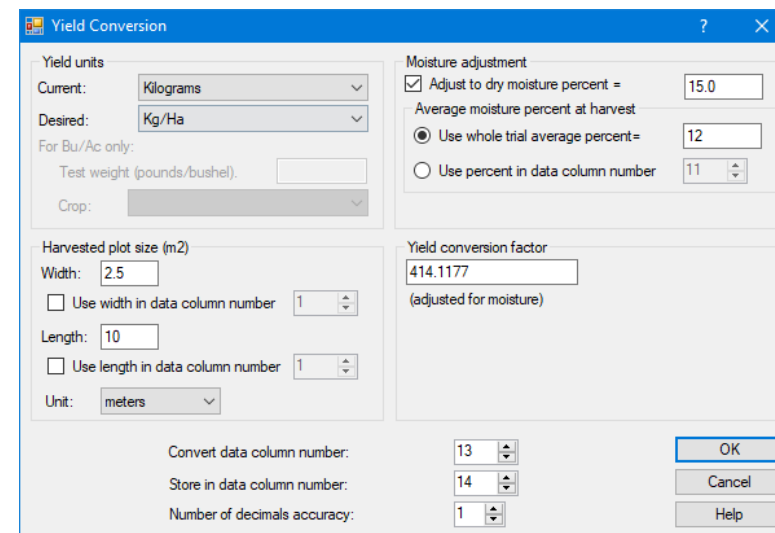
Resulting benefits include:

- Improves **efficiency**
- Increases **accuracy**
- Promotes **quality**

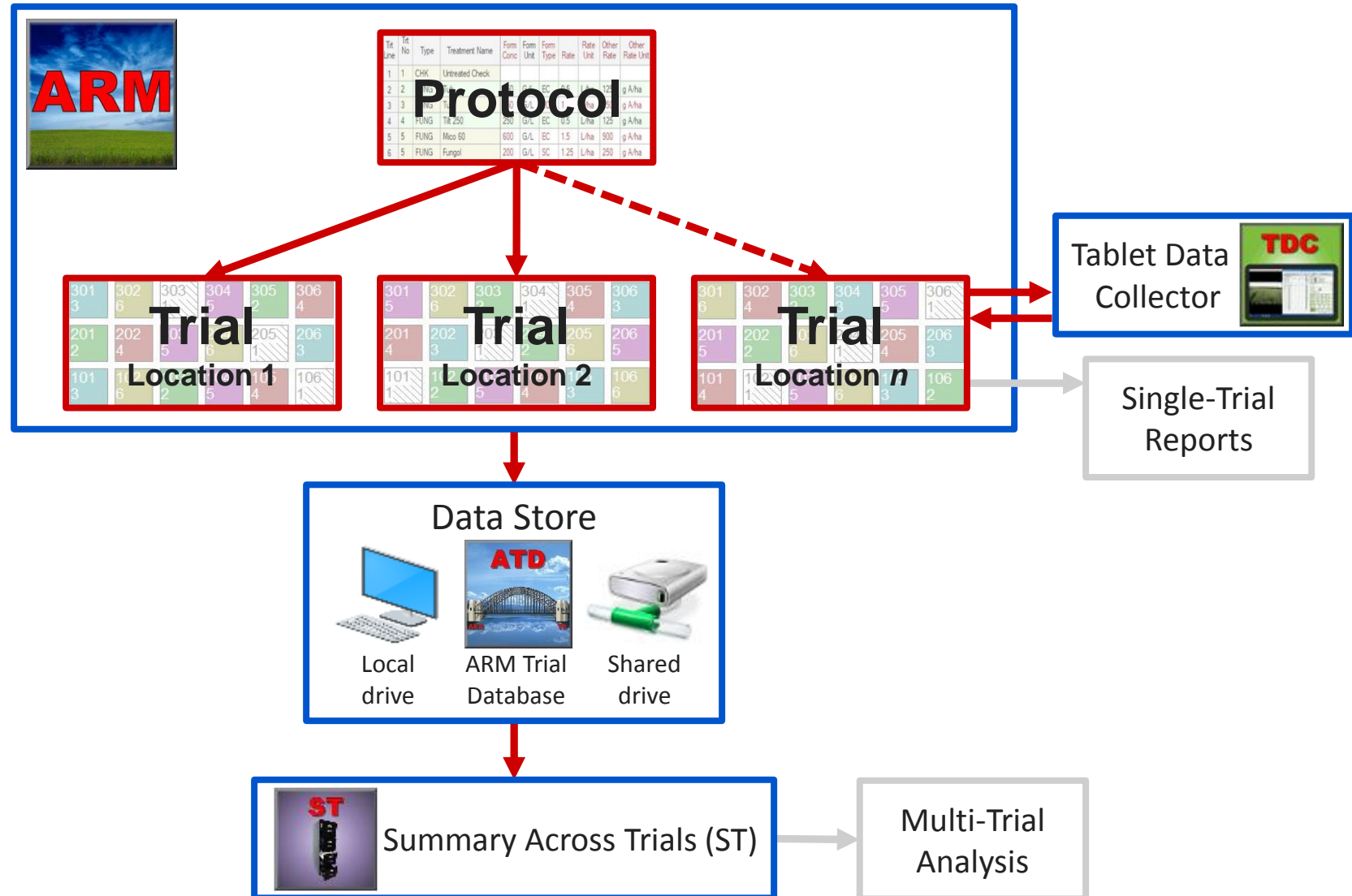


Pest Code Master List (EPPO_CODES)

Pest Code	Pest Scientific Name	Pest Name	Language	Online Reference
1ABRPG	Abortiporus	Abortiporus	IE	https://gd.epppo.int/taxon/1ABRPG
1ABSIG	Absidia	Absidia	IE	https://gd.epppo.int/taxon/1ABSIG
1ACAWF	Acaulosporaceae	Acaulosporaceae	IE	https://gd.epppo.int/taxon/1ACAWF
1ACAWG	Acaulospora	Acaulospora	IE	https://gd.epppo.int/taxon/1ACAWG
1ACCMG	Acrocalymma	Acrocalymma	IE	https://gd.epppo.int/taxon/1ACCMG
1ACETF	Acetobacteraceae	Acetobacteraceae	IE	https://gd.epppo.int/taxon/1ACETF
1ACETG	Acetobacter	Acetobacter	IE	https://gd.epppo.int/taxon/1ACETG
1ACHLG	Achlya	Achlya	IE	https://gd.epppo.int/taxon/1ACHLG
1ACHNF	Achnanthaceae	Achnanthaceae	IE	https://gd.epppo.int/taxon/1ACHNF



ARM Software Workflow



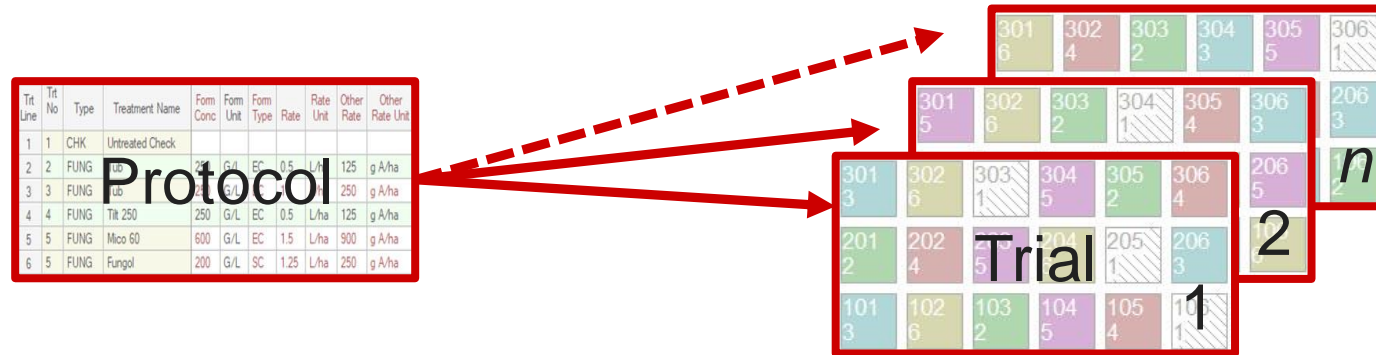
ARM Software Workflow



Tt Line	Tt No	Type	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Other Rate	Other Rate Unit
1	1	CHK	Untreated Check						
2	2							125	g A/ha
3	3								g A/ha
4	4	FLNG	TiL 650	250	G/L	EC	1.5	L/ha	125
5	5	FLNG	Mico 60	600	G/L	EC	1.5	L/ha	500
6	5	FLNG	Fungol	200	G/L	SC	1.25	L/ha	250

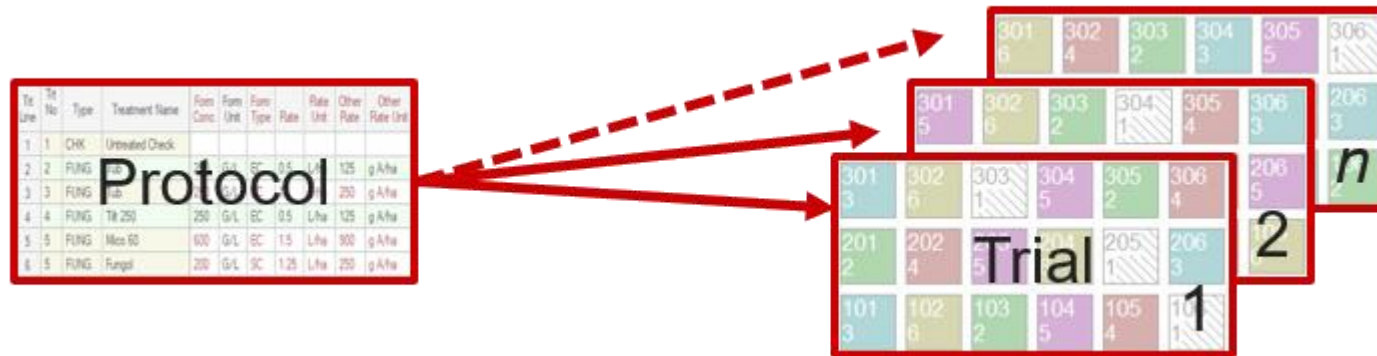
Protocol

Components of a study



The **PLAN** for a research experiment

The **REALIZATION** of the protocol plan for a particular trial locations



Protocol Components:

- **Variety** list
- **Planned assessments**
- **Study rules**

Trial Components:

- Information from protocol
- Variety **randomization**
- **Assessment data**
- Site Description
 - Application
 - Crop and Pest
 - Location

Support for Typical Experimental Designs

Randomize and appropriately analyze

- Completely Random Design (CRD)
- Randomized Complete Block (RCB)
- Augmented RCB and CRD
- Latin Square
- Lattice Designs (Incomplete Block)
- Multi-Factor Designs
 - RCB with Factorial Arrangement of Treatments
 - Split-Plot
 - Strip-Block (Criss-Cross)

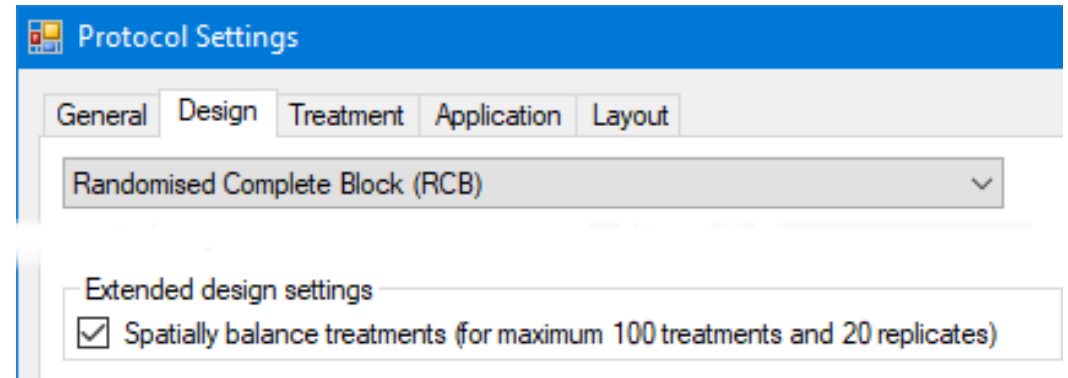
1046 46	1047 47	1048 48	1049 49	1050 50	1051 51	1052 52	1053 53	
1037 37	1038 38	1039 39	1040 40	1041 41	1042 42	1043 43	1044 44	1045 45
1028 28	1029 29	1030 30	1031 31	1032 32	1033 33	1034 34	1035 35	1036 36
1019 19	1020 20	1021 21	1022 22	1023 23	1024 24	1025 25	1026 26	1027 27
1010 10	1011 11	1012 12	1013 13	1014 14	1015 15	1016 16	1017 17	1018 18
1001 1	1002 2	1003 3	1004 4	1005 5	1006 6	1007 7	1008 8	1009 9

Options	Movement Arrows	Treatment Description	Comment
			Reset
1	CHK	CHOICES SP5061 76600 Seeds/ha	
2		JOHNSON FARMS 75D00 76600 Seeds/ha	
3		JOHNSON FARMS 71B81 76600 Seeds/ha	
4		STATE 4760 SSTAX RIB 76600 Seeds/ha	

Spatially balanced randomization

For RCB designs, randomization is optimized to uniformly disperse treatments across the trial

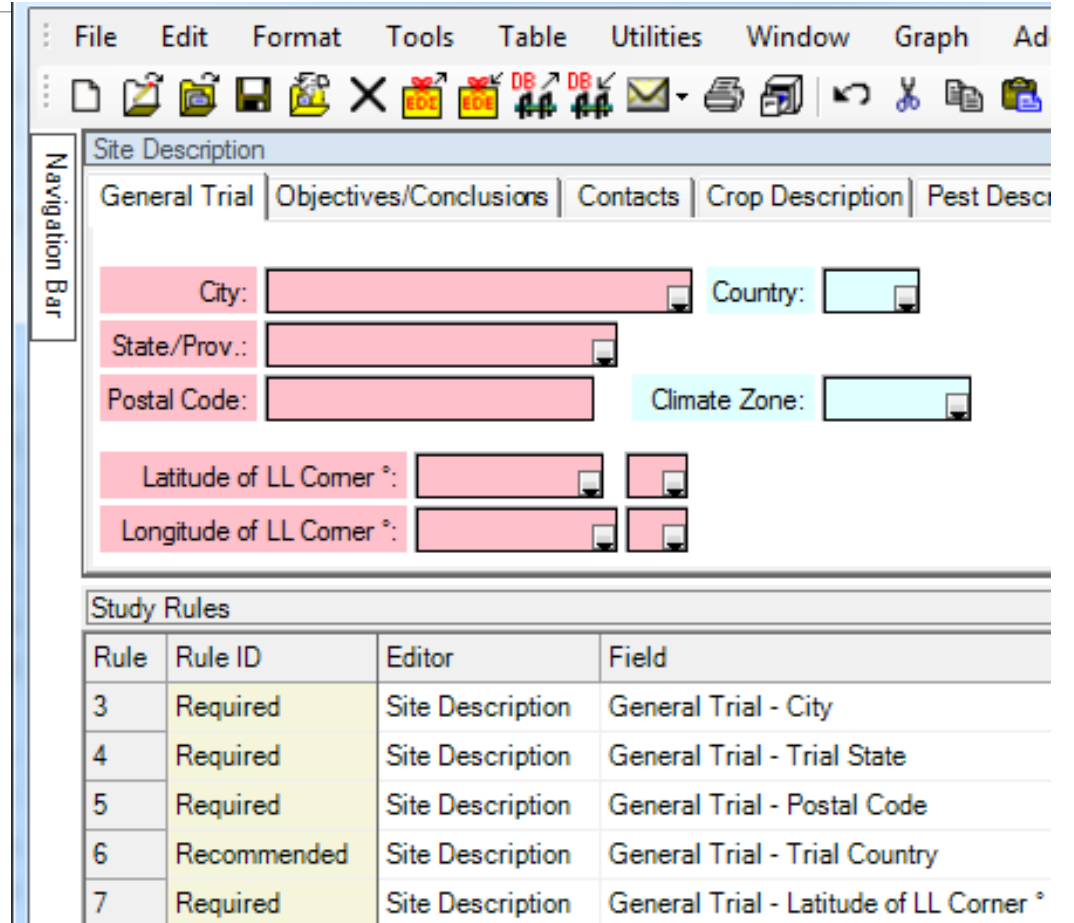
Balances average distance between all treatment pairs across replicates



101 7	102 2	103 6	104 3	105 4	106 1	107 5
201 2	202 1	203 3	204 6	205 7	206 5	207 4
301 7	302 5	303 4	304 6	305 2	306 3	307 1
401 1	402 7	403 3	404 4	405 6	406 2	407 5
501 2	502 4	503 7	504 1	505 6	506 3	507 5

Study Rules: Key Protocol Component

Study rules clearly identify key information to record in each trial created from the protocol



The screenshot displays a software application window with a menu bar (File, Edit, Format, Tools, Table, Utilities, Window, Graph, Ad) and a toolbar. The main area is divided into two sections. The top section, titled 'Site Description', contains a form with several input fields: 'City', 'State/Prov.', 'Postal Code', 'Country', 'Climate Zone', 'Latitude of LL Corner °', and 'Longitude of LL Corner °'. The bottom section, titled 'Study Rules', contains a table with the following data:

Rule	Rule ID	Editor	Field
3	Required	Site Description	General Trial - City
4	Required	Site Description	General Trial - Trial State
5	Required	Site Description	General Trial - Postal Code
6	Recommended	Site Description	General Trial - Trial Country
7	Required	Site Description	General Trial - Latitude of LL Corner °

Study Rules

Lock protocol or site description fields (such as Trial ID), to prevent modifying information in those fields by:

- Everyone else
- Everyone who is not in my company

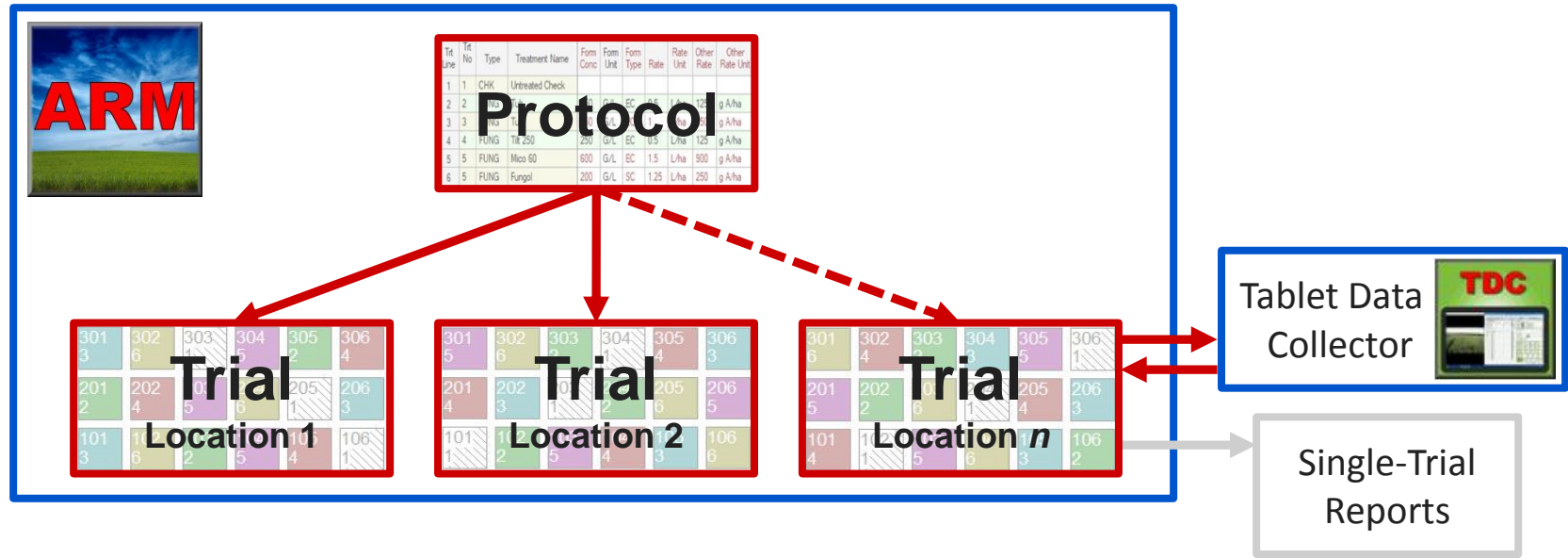
Display "All" for an assessment rule that applies to all data columns

Rule ID	Editor	Field	Condition	Columns/Trit Lines	Permissions
Strict Validation	Assessment Data	Rating Type	Always	All	All protocol owners
Strict Validation	Assessment Data	Rating Unit	Always	All	All protocol owners

Study Rules

- Entire trial revalidates after adding new study rules to a validated trial, and also that study rules are entered correctly
- Messages for invalid study rules identify which information to correct
- 'Delete Rule' button removes a marked block
- Right-click menus to add rules

ARM Software Workflow



Assessment Editor

'Data out of bounds' dialog identifies the issue plus what action to take next

Data in column 1 must be within 0-100 when 'Rating Unit' is set to '%'.
1000

Select 'OK' after entering a number within current data boundaries for this column.
Select 'Cancel' to keep the out of bound data and return to assessment editor to change the limits.

Data in column 1 must be within 0-100 when the 'ARM Action Codes' contains 'P'.
Data in column 20 must be within 0-5 when 'Rating Unit' is set to '0-5'.
Data in column 1 must be within 1-10 when 'Scale Minimum' is set to '1' and 'Maximum Category' is set to '10'.

For a data column that is already partially filled, can continue pasting to add more assessment data into that column

Mirus Connection

C:\HarvestMaster\Mirus

EXPORT

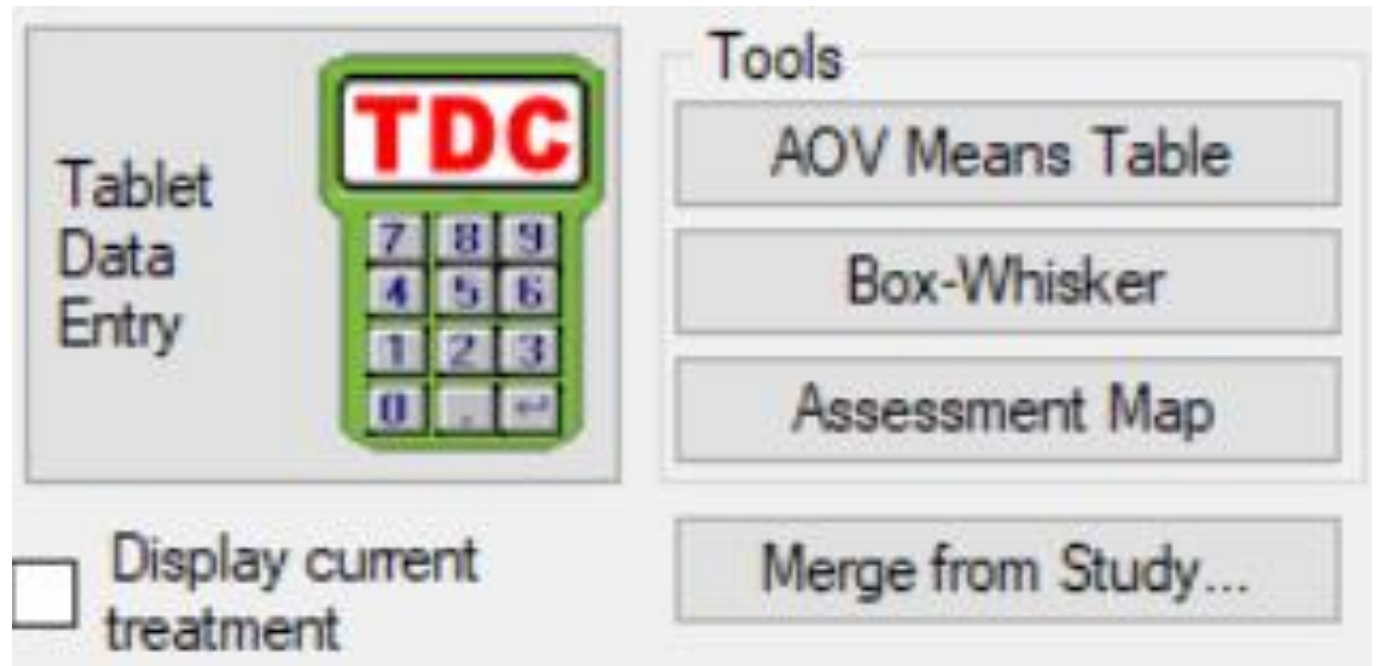


IMPORT



Data Review Tools – column properties

- Data analysis (Analysis of Variance)
- Box-Whisker Graph
- Assessment Map



AOV Means Table

Entry No.	Entry Name	Seeding Rate	Unit	
				7
39	WIE SM W1114VT5RIB	76600	seeds/ha	6 f-k
40	WIE SM W80878STXRIB	76600	seeds/ha	7 b-i
41	WIE SM W11007VT5RIB	76600	seeds/ha	7 a-g
42	WIE SM W10875VT5RIB	76600	seeds/ha	6 d-j
43	WIE SM W10886VT5RIB	76600	seeds/ha	7 a-g
44	HE INZ 715STXRIB	76600	seeds/ha	6 c-i
45	HE INZ 756VT5PRORIB	76600	seeds/ha	5 h-l
46	HE INZ 665VT5PRORIB	76600	seeds/ha	5 g-l
47	KSEED 1	76600	seeds/ha	5 g-l
48	HE INZ 667STX	76600	seeds/ha	7 b-i
49	HE INZ 6550VT5PRO	76600	seeds/ha	8 a-e
50	KSEED 5	76600	seeds/ha	9 a
51	STATION 187-50STXRIB	76600	seeds/ha	8 a-e
52	STATION 185-11VT5PRIB	76600	seeds/ha	8 a-f
Tukey's HSD P=.05 (% mean diff)				2.1 (34%)
Standard Deviation				0.7
CV				11.66
Grand Mean				6.4
Levene's F				1.029
Levene's Prob(F)				0.435
Skewness				-0.2073
Kurtosis				-0.6854*
Minimum Replicates (power = 80)				2
Largest Mean Difference (% mean diff)				5.8 (90%)
Replicate F				0.851
Replicate Prob(F)				0.4681
Treatment F				16.176
Treatment Prob(F)				0.0001

- AOV=Analysis of Variance
- Treatment means
- Mean comparison test
- Descriptive statistics
- AOV assumption violations
- Evidence of significant treatment/rep. differences

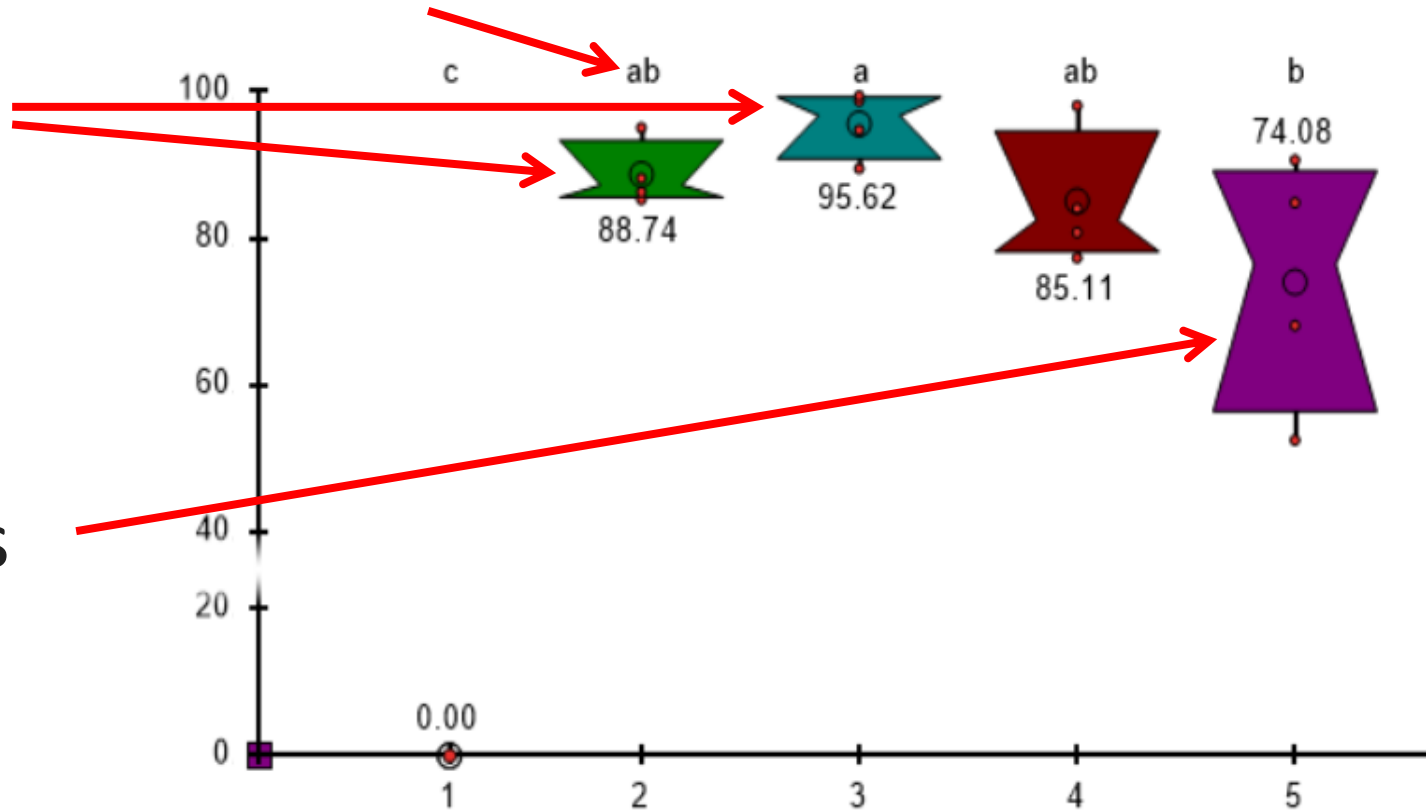
Means followed by same letter or symbol do not significantly differ (P=.05, Tukey's HSD)
 Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.
 Could not calculate Tukey's HSD (% mean diff) for columns 12,13 because error mean square = 0.
 Could not calculate Largest Mean Difference (% mean diff) for columns 12,13 because error mean square = 0.
 For a useful analysis of future trials, trial Error DF should be >=12.

Variability Graph (Box-Whisker)

Mean comparison test at 5%

Stable across replicates

More variable across replicates

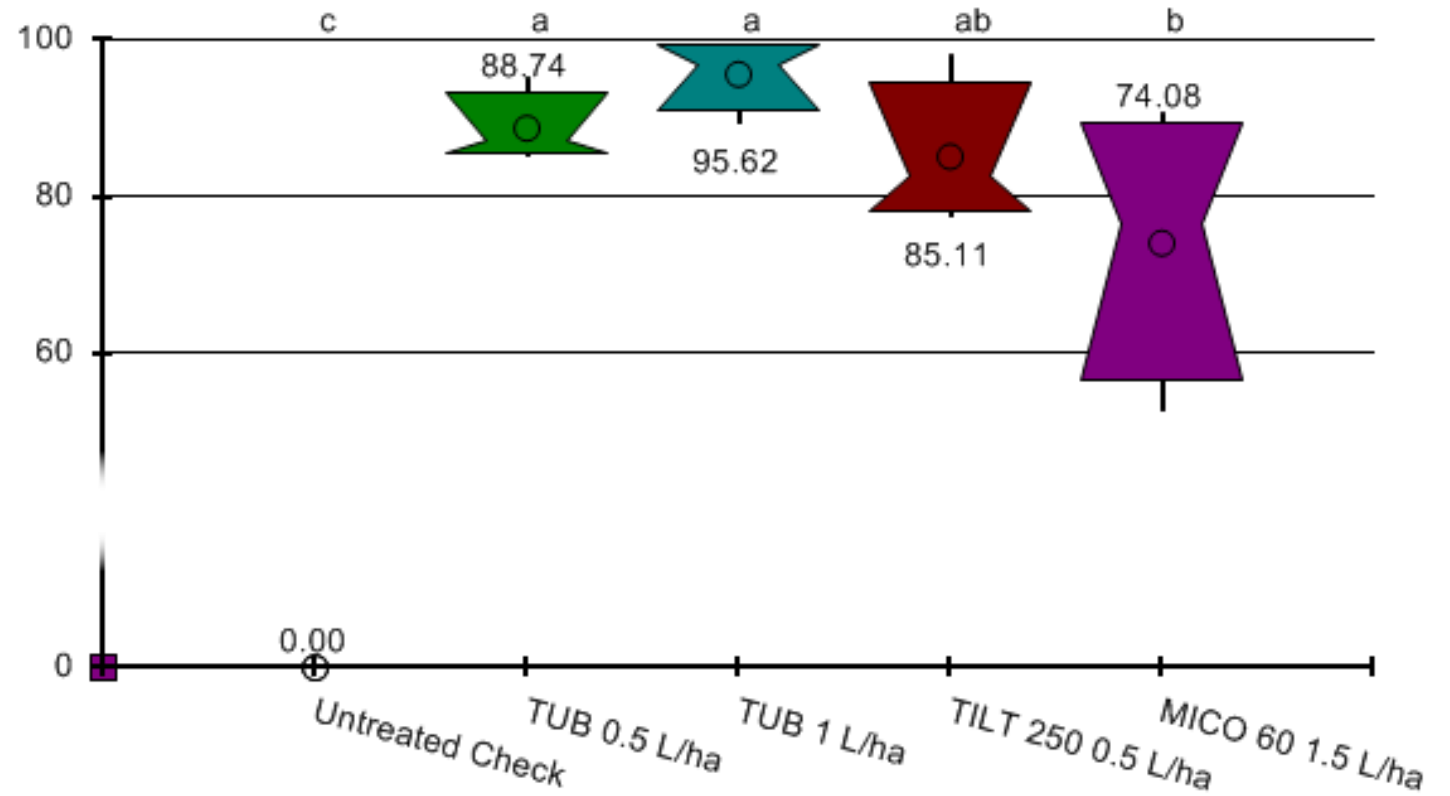


Box-Whisker Graph

Box height shows treatment stability across replicates

Skewed waist position shows a replicate difference

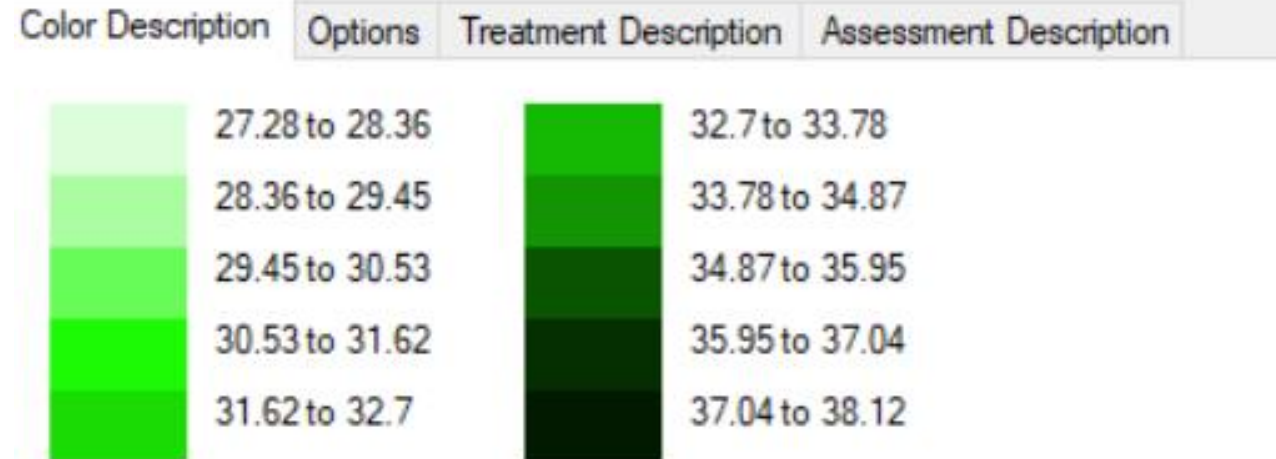
Simplest method to view treatment variance(s)



Assessment Map

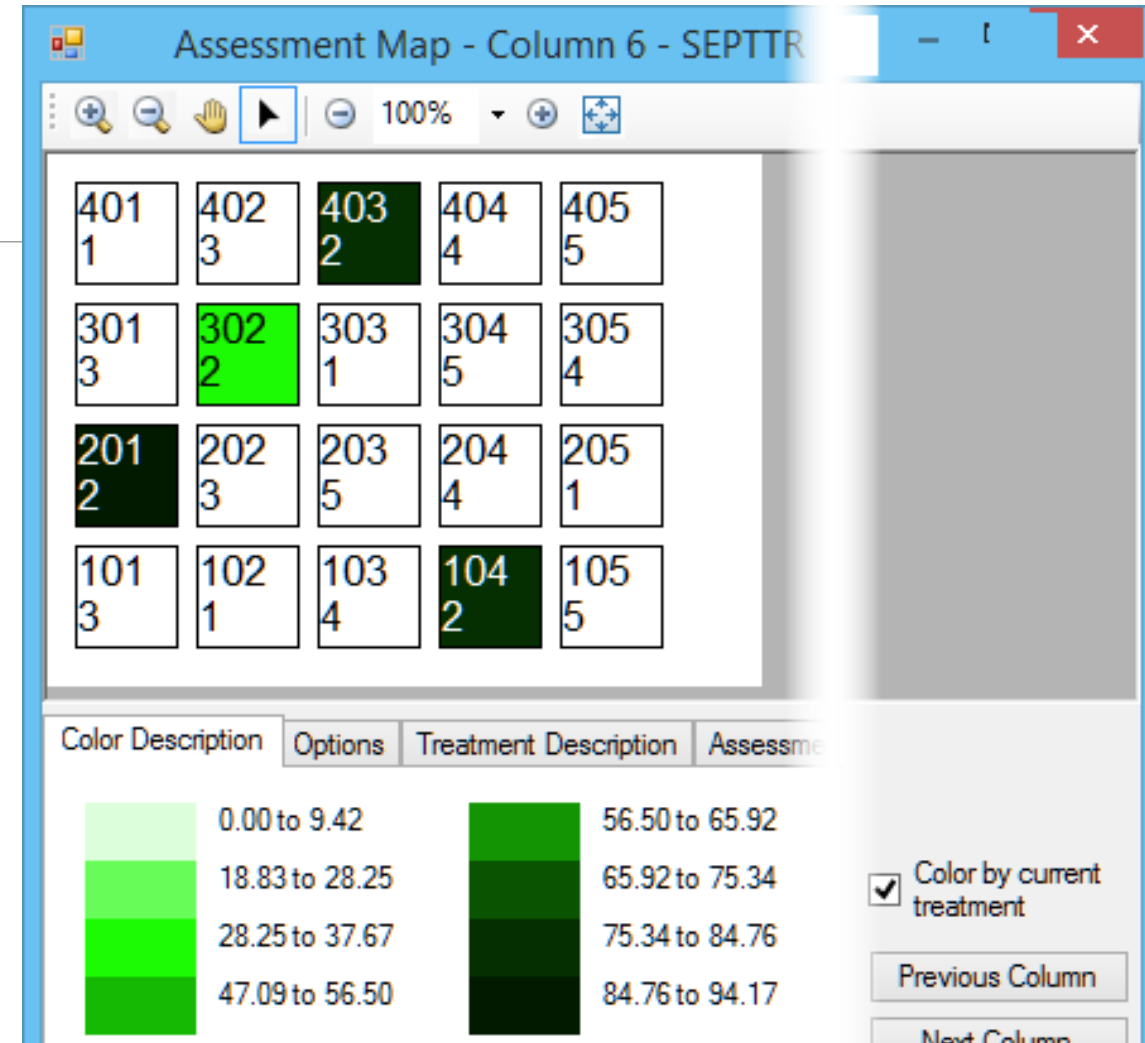
"Heat map" shows response differences per assessment data column by color intensity:

- Treatment consistency
- Possible site variations as dark or light zones
- Plot problems



Assessment Map

- 'Color by current treatment' option
 - Easily review treatment variation
 - Identify treatment positions within replicate



Assessment Data "Column Properties"

- Offers data overview
- Presents analysis of current data column
- Fixes violations of AOV assumptions
- Finds statistical outliers

Column Number	1
<i>BBCH Scale</i>	<i>BCOR</i>
Crop Scientific Name	Zea mays indentata
Crop Name	Dent com
Description	Stand Count
Part Rated	PLANT
Rating Date	10/5/2017
Rating Data Type	COUPLA
Rating Unit	NUMBER
Collection Basis, Unit	1 PLOT
Number of Subsamples	1
Crop Stage Scale	VR
Crop Stage Majority	V1
Assessed By	Kyle K
<i>SE Group No.</i>	1
SE Description	1

+	Sub	Rep	Blk	Col	Plot	Trt	1
🔒	1	1	1	1	1001	1	67
📄	1	1	1	2	1002	2	64
	1	1	1	3	1003	3	62
	1	1	1	4	1004	4	58
	1	1	1	5	1005	5	67
	1	1	1	6	1006	6	63
	1	1	1	7	1007	7	62
	1	1	1	8	1008	8	65

Column 1 Properties	
Previous	Next
Column Flags:	Original
Low/High value:	53 71
Descriptive Statistics Refresh	
Tukey's HSD P=.05:	8.9
Standard Deviation:	3.1
CV:	4.7
Grand Mean:	64.52
Levene's Prob(F):	0.647
P(Friedman's X2):	0.615
Skewness:	-1.0924
Kurtosis:	2.0936
Replicate Prob(F):	0.4354
Treatment Prob(F):	0.6781
✖ Does not meet assumptions of AOV: data has heterogeneity of variance/skewness/kurtosis	
Fix	
Outliers	
<input checked="" type="radio"/>	> +/- 3 standard deviations from grand mean
<input type="radio"/>	> +/- 2 standard deviations from grand mean
<input type="radio"/>	Box-Whisker
<input checked="" type="checkbox"/>	Skip damaged assessments
<input type="checkbox"/>	Based on subsample values
Find Next	

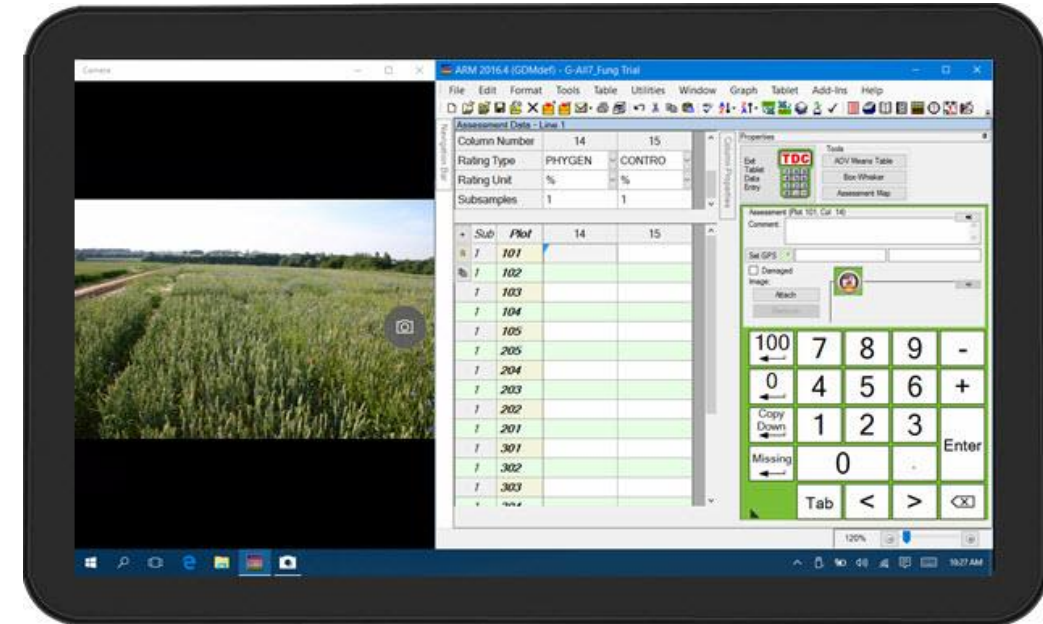
Tablet Data Collector (TDC_x) Add-In

Includes Tablet Data Collector (TDC) features for:

- An activated ARM license serial number
- on your touch-enabled Windows tablet

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

1. Purchase a touch-enabled Windows tablet, then
2. Install and activate your ARM license on this tablet - either:
 - a) Transfer your current ARM license to computer and purchase TDC_x Add-In, or
 - b) Purchase **NEW** ARM Field license to obtain ARM field data entry license plus TDC_x



Recommended minimum requirements to use TDC_x:

Camera (6+ megapixel)
SD card or micro flash (backup)
64+ GB Internal Storage

GPS
Stylus
4+ GB RAM

TDCx Improves Assessment Quality

- Enter data only once to avoid transcription errors
- Employ appropriate range checking for assessed values
- Perform data quality checks before leaving trial site (analyze, graph)
- Include photographs that illustrate or support measurements & observations

Image Documentation/Storage

Trt 1 (Plot 1001, Col 3) 11%

Assessment (Plot 2011, Col 3) 11%

Assessment (Plot 3012, Col 3) 8%

Assessment (Plot 4020, Col 3) 11%

Days After Emergence					
ARM Action Codes					
	Sub	Rp	Bk	Col	Pl
+	1	1	1	1	1
	1	1	1	2	2
	1	1	1	3	3
	1	1	1	4	4
	1	1	1	5	5
	1	2	2	1	1
	1	2	2	2	2
	1	2	2	3	3
	1	2	2	4	4
	1	2	2	5	5
	1	3	3	1	301
	1	3	3	2	302
	1	3	3	3	303

Remove
Rename

Spatial Analysis

Trend analysis

- Analyze effects across whole field

Nearest Neighbor analysis

- Analyze effects only in space adjacent to individual plots

Automatic – ARM will select best-performing model

- AIC – estimates relative quality of available models (lower is better)



AOV - Spatial Report Options

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

Spatial Method: Automatic

Mean comparison test: LSD

Descriptive statistics: Spatial AIC

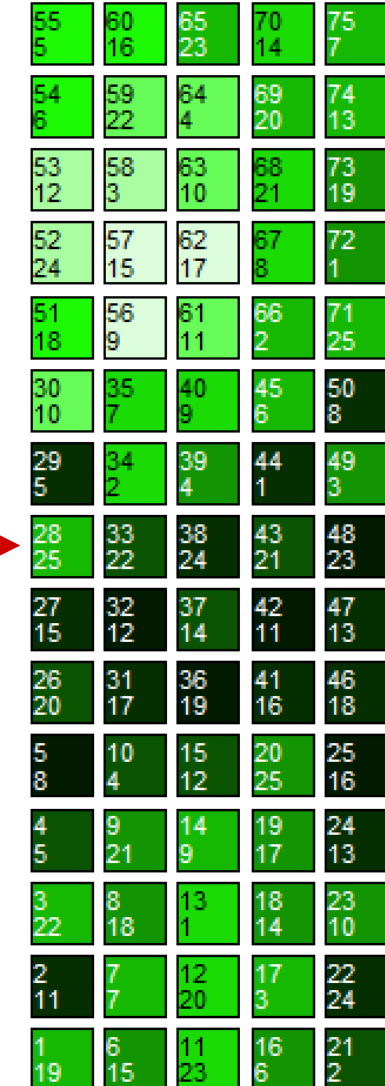
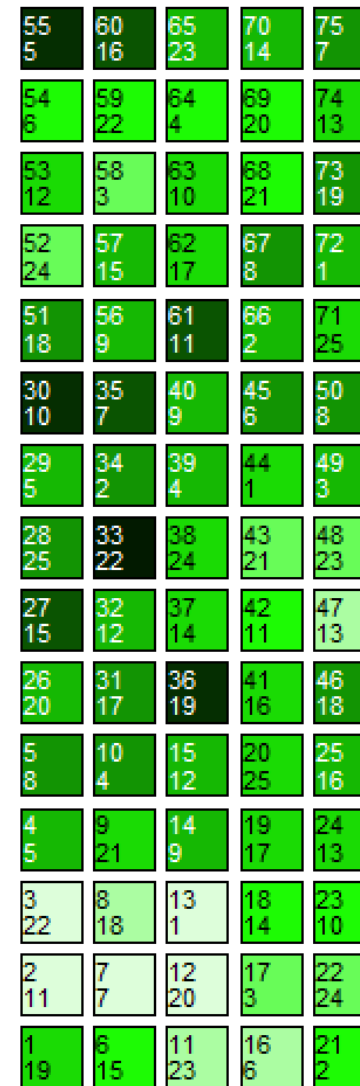
Rating Unit				T-MET
ARM Action Codes				TY1
Trt No.	Treatment Name	Rate	Rate Unit	
				12*
1	Untreated Check			7.84 b
2	Tub	0.5	l/ha	8.53 a
3	Tub	1	l/ha	8.45 a
4	Tilt 250	0.5	l/ha	8.70 a
5	Mico 60	1.5	l/ha	8.48 a
LSD P=.05				0.347
Standard Deviation				0.217
CV				2.58
Randomized Complete Block (RCB) AIC				5.1456
Spatial AIC				SPa 3.6037

SPa = Quadratic spatial trend

Spatial Analysis

Attempts to recover information about hidden variables across a field

CRD + Quadratic spatial trend AOV For TRZAW Winter wheat GRAIN C					
Source	DF	Sum of Squares	Mean Square	F	Prob(F)
Total	18	5.170991 ^A			
Treatment Type III	4	1.441301	0.360325	7.676	0.0056
Blk	1	3.181476	3.181476	67.778	0.0001
Col	1	0.004818	0.004818	0.103	0.7560
Blk^2	1	0.053378	0.053378	1.137	0.3140
Col^2	1	0.055852	0.055852	1.190	0.3037
Blk:Col	1	0.011706	0.011706	0.249	0.6295
Error(adj)	9	0.046940			



Original

Neighbor-adjusted

Weather Data Integration

Weather analysis explains varying product performance within efficacy trials (year, location)

Increased emphasis on developing biostimulants, plant health products – highly responsive to weather conditions.



Weather Data Integration

Iteris ClearAg Collaboration

Iteris ClearAg weather and environmental 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>



Weather Data Integration

Site Description – additional fields added

Daily and 30-Year average:

- Precipitation
- Air Temperature – Min/Max/Average
- Wind speed – Min/Max/Average
- Sunlight (Shortwave Radiation)

Others:

- % Cloud Cover
- Soil Temp – Average
- Soil Moisture – Scaled 0-10cm or 0-200cm

Moisture				30Y		Min	Max	Avg	Temp	30Y	30Y	30Y	
Total	Unit	Type		Precipitation	Unit	Temp	Temp	Temp	Unit	Min Temp	Max Temp	Avg Temp	Unit
0.4	mm	RAIN		1.3	mm	17	29	22	C	13	23	18	C
17.4	mm	RAIN		1.4	mm	16	24	19	C	13	22	17	C

Min	Max	Avg		% Cloud	Avg Shortwave		Avg		0-10 cm Scaled	0-200 cm Scaled
Wind	Wind	Wind	Unit	Cover	Radiation	Unit	Soil Temp	Unit	Soil Moisture	Soil Moisture
1	14	6	kph	58	143	W/m2	24	C	0.08	0.34
2	21	10	kph	62	152	W/m2	21	C	0.49	0.39

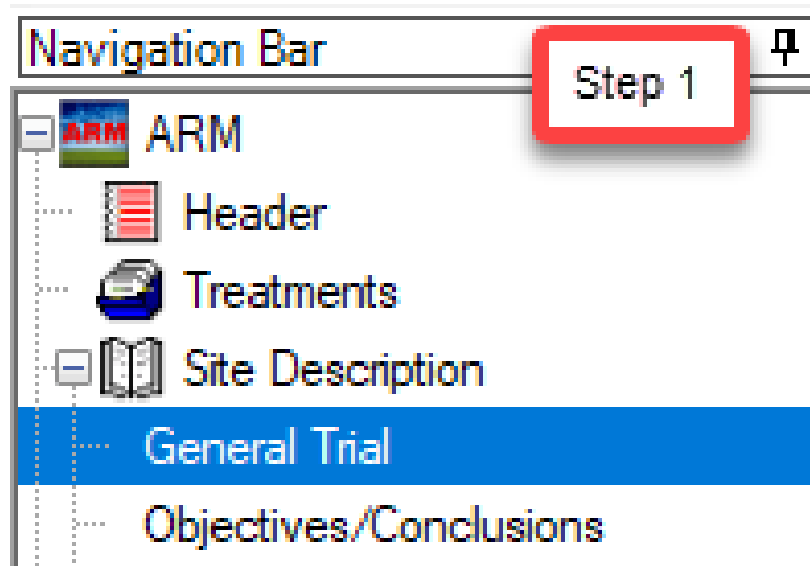
Weather Data Integration

Trial GPS Coordinates

Required fields:

Site Description editor > General Trial tab >

Latitude of LL Corner° and **Longitude of LL Corner°**



Latitude of LL Corner °:	<input type="text" value="50.539096"/>	<input type="button" value="Y"/>	<input type="button" value="N"/>
Longitude of LL Corner °:	<input type="text" value="4.677259"/>	<input type="button" value="Y"/>	<input type="button" value="E"/>

Weather Data Integration

Weather API provider subscription

Tools > Import Weather Data

Settings > enter License ID (from subscriber) and Data Center

A screenshot of a software dialog box titled "Weather Import Settings". The dialog is divided into two sections. The top section, titled "Weather Import", contains a dropdown menu for "Application" set to "Iteris ClearAg". The bottom section, titled "Weather Import Settings", contains a "Connection" group with three fields: "Application" (dropdown, "Iteris ClearAg"), "ID" (text input field with red dots, highlighted with a red box), and "Data Center" (dropdown, "United States"). Below these fields are "OK", "Cancel", and "Help" buttons. At the bottom of the dialog, there is a checkbox for "Import missing application weather data for dates within last 2 years", radio buttons for "Measurement unit" (selected "Metric", "US standard"), and a "Settings..." button (highlighted with a red box) along with "OK", "Cancel", and "Help" buttons.

Weather Data Integration

Import daily historical weather conditions

Add a row to the Weather table in Site Description for each day in the specified range.

Imports daily averages or totals for moisture, temperature, wind, and soil conditions.

Weather Import

Application: Iteris 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

Weather Data Integration

Import daily historical weather conditions

No.	Date	Moisture Total	Unit	Precipitation	Unit	Type	Min Temp	Max Temp	Avg Temp	Temp Unit	% Relative Humidity	Min Wind	Max Wind	Avg Wind	Unit	% Cloud Cover	Avg Shortwave Radiation	Unit	Avg Soil Temp
1.	Apr-1-2018	0	mm	0	mm	RAIN	-15	4	-4	C	68	0	14	6	kph	31	217	W/m2	-4
2.	Apr-2-2018	0	mm	0	mm	RAIN	-8	0	-4	C	85	1	37	13	kph	51	128	W/m2	-4
3.	Apr-3-2018	0	mm	0	mm	RAIN	-13	1	-6	C	83	0	14	6	kph	36	186	W/m2	-4
4.	Apr-4-2018	0	mm	0	mm	RAIN	-9	4	-2	C	82	4	32	17	kph	54	131	W/m2	-4
5.	Apr-5-2018	0	mm	0	mm	RAIN	-4	-2	-4	C	92	2	26	15	kph	100	61	W/m2	-4
6.	Apr-6-2018	0	mm	0	mm	RAIN	-4	2	-1	C	89	0	20	7	kph	100	107	W/m2	-3

Weather Data Integration

Batch import historical weather

Import weather data into multiple trials, based on Trial Initiation and Trial Completion dates of each trial.

Selected	Study ID	Initiation Date	Completion Date
<input checked="" type="checkbox"/>	G-All7_Weather	5/3/2017	9/29/2017
<input type="checkbox"/>	LWA	4/20/2017	
<input checked="" type="checkbox"/>	G-Seed7-Broccoli_Var_1	5/20/2015	10/30/2015
<input type="checkbox"/>	ST-Exam4	5/2/2014	10/30/2014
<input type="checkbox"/>	ST-Intermediate4	5/2/2014	
<input type="checkbox"/>	ST-Exam2	4/30/2014	
<input type="checkbox"/>	ST-Intermediate2	4/30/2014	
<input type="checkbox"/>	ST-Exam3	4/28/2014	
<input type="checkbox"/>	ST-Intermediate3	4/28/2014	
<input type="checkbox"/>	ST-Exam1	4/25/2014	
<input type="checkbox"/>	ST-Exam5	4/25/2014	
<input type="checkbox"/>	ST-Exam6	4/25/2014	
<input type="checkbox"/>	ST-Intermediate1	4/25/2014	

Context menu options:

- Delete File
- Rename File
- Move File
- Archive File
- Clear Field Map Link
- Import Weather Data For Selected Trial(s)...**
- Previous Versions...

Weather Import

Application: Iteris ClearAg

Import daily weather data from trial initiation to trial completion

Import weather data to blank weather fields

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

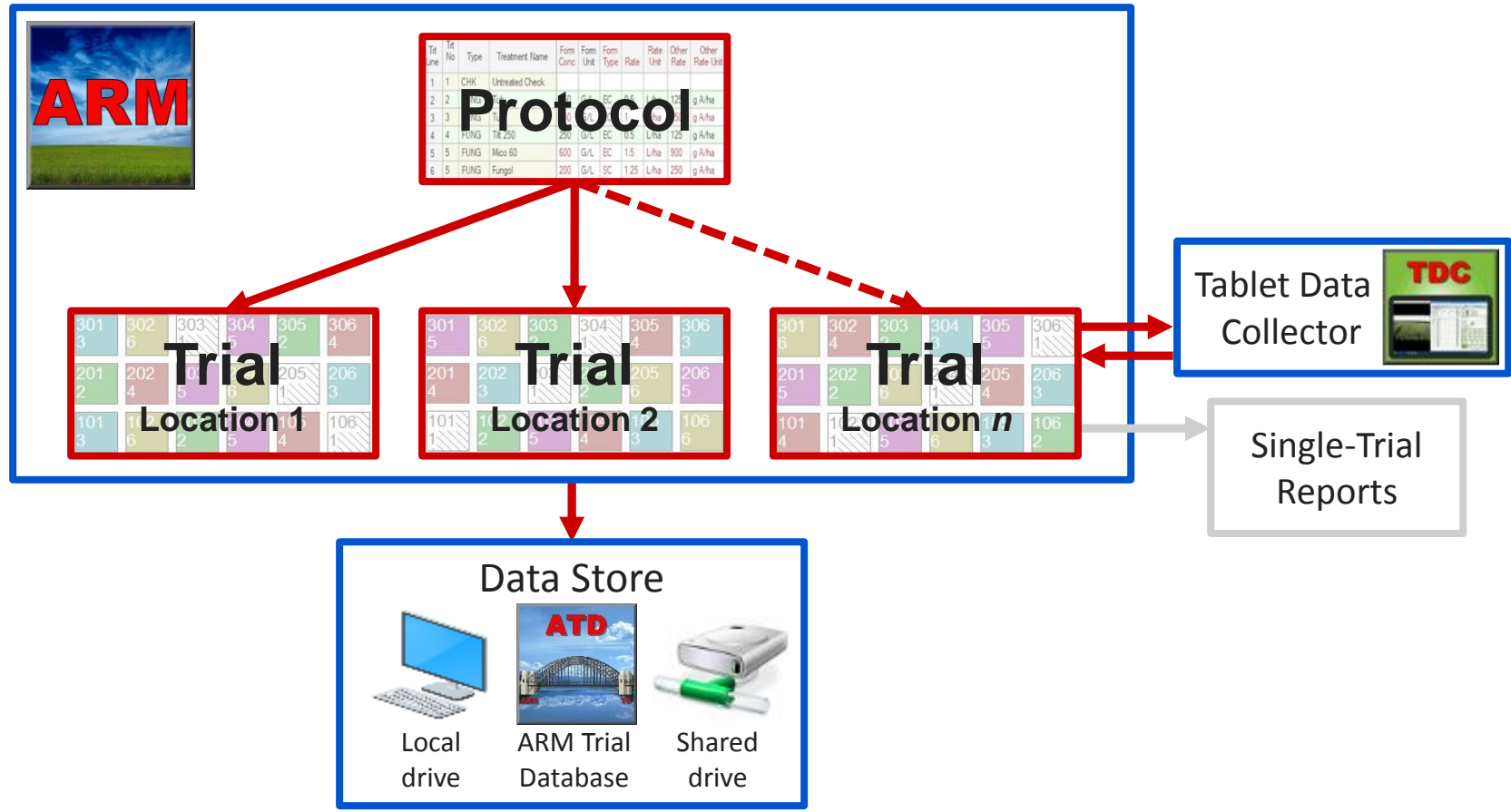
Measurement unit: Metric US standard

Settings... OK Cancel Help

Benefits of using ARM

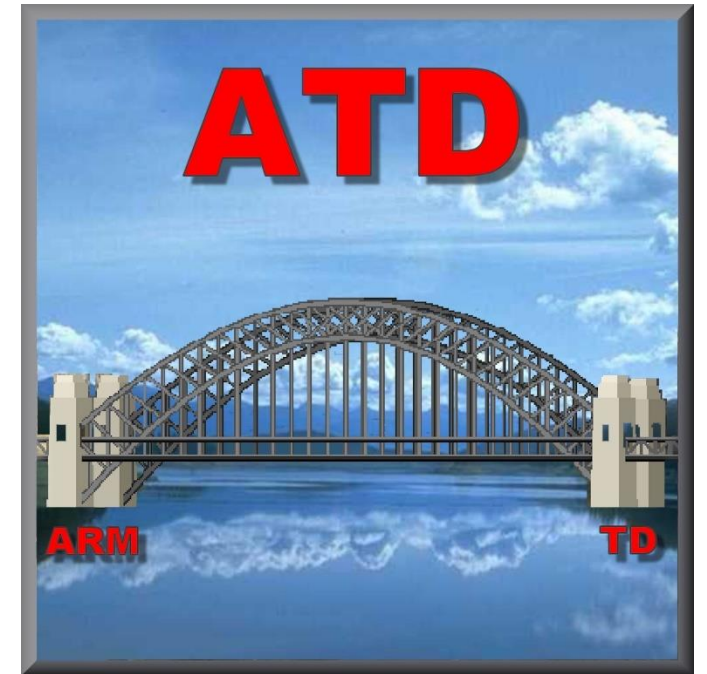
- Sophisticated Integrated statistics package
 - analysis of variance
 - several mean separation tests
 - correlation analysis
- Integrated functions for data transformation on nonhomogeneous data (Log, square root, Arcsin)
- Several integrated calculation formulas
 - yield area, relative yields
 - Henderson & Tilton, Abbott
 - user-defined calculations

ARM Software Workflow

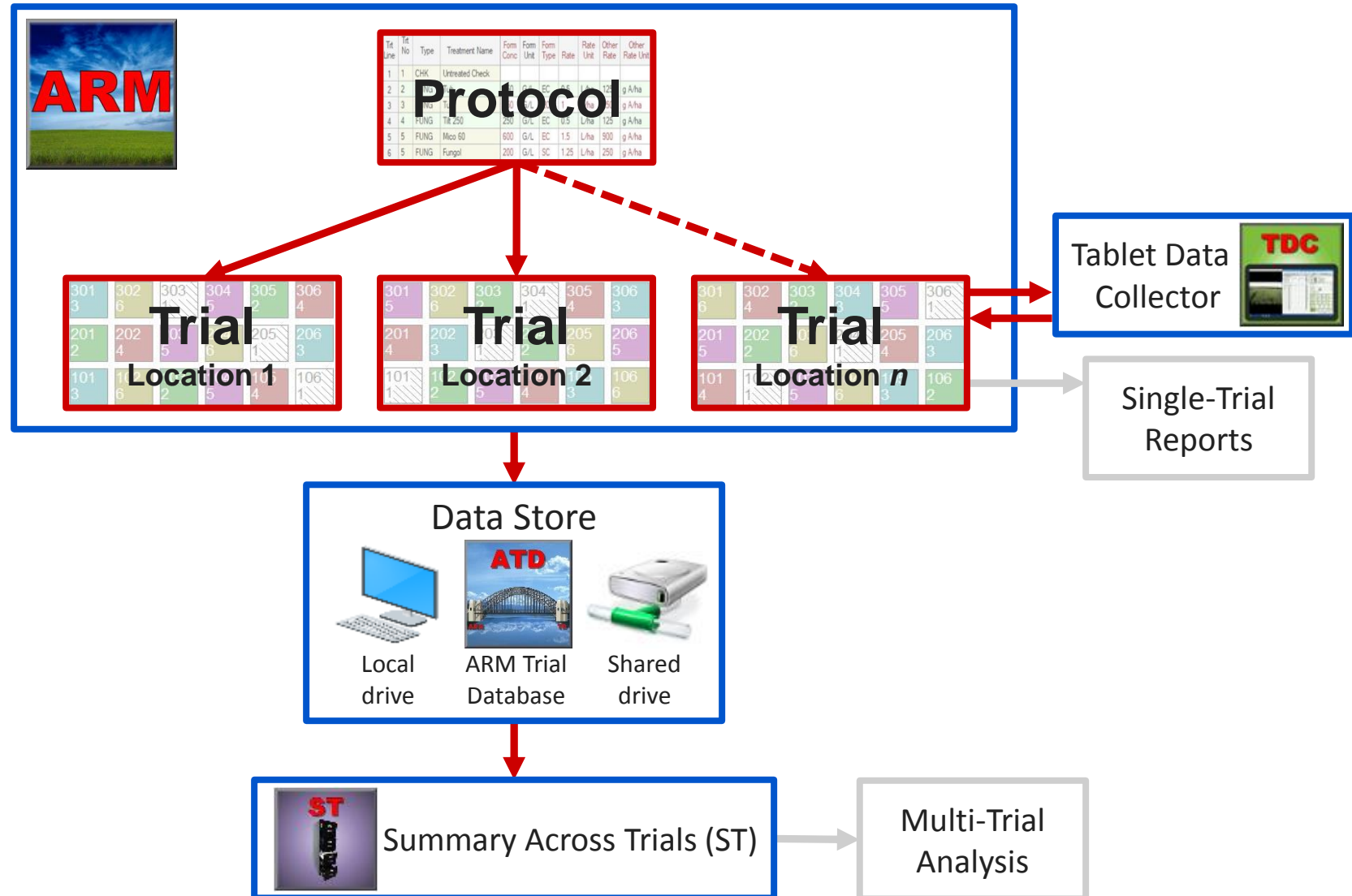


ATD: ARM Trial Database

- Optional ARM add-in
- Define queries to search and select trials of interest
- Report trial information in Word or Excel documents that are linked to the database
- Permanent storage of trial information
- Share ARM trials across a network



ARM Software Workflow



ST: Summary Across Trials

- Optional ARM add-in to summarize a trial series
- Summarize selected entries/treatments across a wide range of trials
- View and arrange summary on a grid
- Export the report to Word, Excel, PDF
- Data graphs of across-trial means
- Export raw data to other statistics software



Sharing information

Send To

- Combines:
 - Protocol with attachments, or
 - Trial with assessment images, reports, and other attachments
- Validates study for missing or invalid information before sending
- Share through email, cloud storage



Data Export

- Converts trial information to preferred file types for additional analysis or graphing



Video Tutorials

[Home](#) » [Resources](#) » Video Tutorials

Video Tutorials

Below is a list of tutorial-style videos that are available to help perform various tasks with GDM products

Click on an image thumbnail to navigate to the full article and view the video.

- Meeting Calendar
- Meeting Handouts
- Training
- Contract Researchers
- Research Sponsors
- Newsletters
- Data Handling Service
- Video Tutorials**



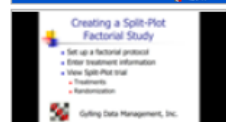
[ARM Software Overview](#)

In this video, we provide a high-level overview of the ARM Software Suite. We explore the base ARM program, and between its [...more](#)



[Installing ARM](#)

In this video, we demonstrate how to download and install ARM to your computer. After viewing the video below, click here to [...more](#)



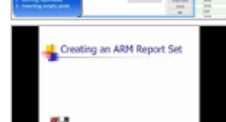
[Creating a Split-Plot Factorial Study](#)

This video demonstrates how to set up a factorial protocol in ARM and enter treatment information, then views a Split-Plot trial to see how the [...more](#)



[Editing the Trial Map](#)

In this video, the basics of editing the trial map randomization are illustrated: Swapping treatments Moving replicates Inserting empty plots. If having troubles viewing [...more](#)



[Creating an ARM Report Set](#)

This video covers the basics of using ARM report sets, including: Configuring the report list Saving the report set Loading a report set If [...more](#)



[TDC Tutorial Video](#)

Dr. Bernd Stratmann, of ADC GmbH, has created a tutorial video to assist researchers in getting started with the Tablet Data Collector. He steps through [...more](#)



Benefits of Using ARM

ARM Offers:

- Structure so trials are entered consistently
- Dictionaries to standardize vocabulary
- Enter information only once

Resulting Benefits:

- Portability across languages and platforms
- Automation of routine tasks
- Improved efficiency, accuracy, and quality



Benefits of Using ARM

- Includes ideas from thousands of clients
- Easily exchange data with other researchers
- Maintained by stable staff
- GDM in the research trial management software business more than 30 years

Future needs

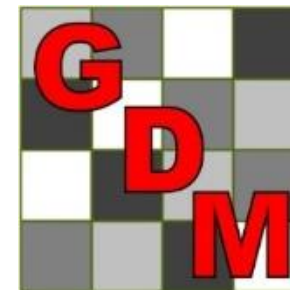
- Ag research industry is always changing
- Computer technology changes even more rapidly
- Constant development to add requested features and keep up with current practices

Software Must "Grow"

As research methods and objectives change and improve, software must also adapt to support those new research objectives and methods.

"Unchanging" software:

- Becomes less useful each year.
- Can be costly by "losing" (not supporting) information gathered with new technology.



Thank you!



Learn more about ARM software!

Watch video tutorials at

[www.gdmdata.com/Resources/Video Tutorials](http://www.gdmdata.com/Resources/Video%20Tutorials)

Give ARM a try!

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Purchase ARM today!

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