



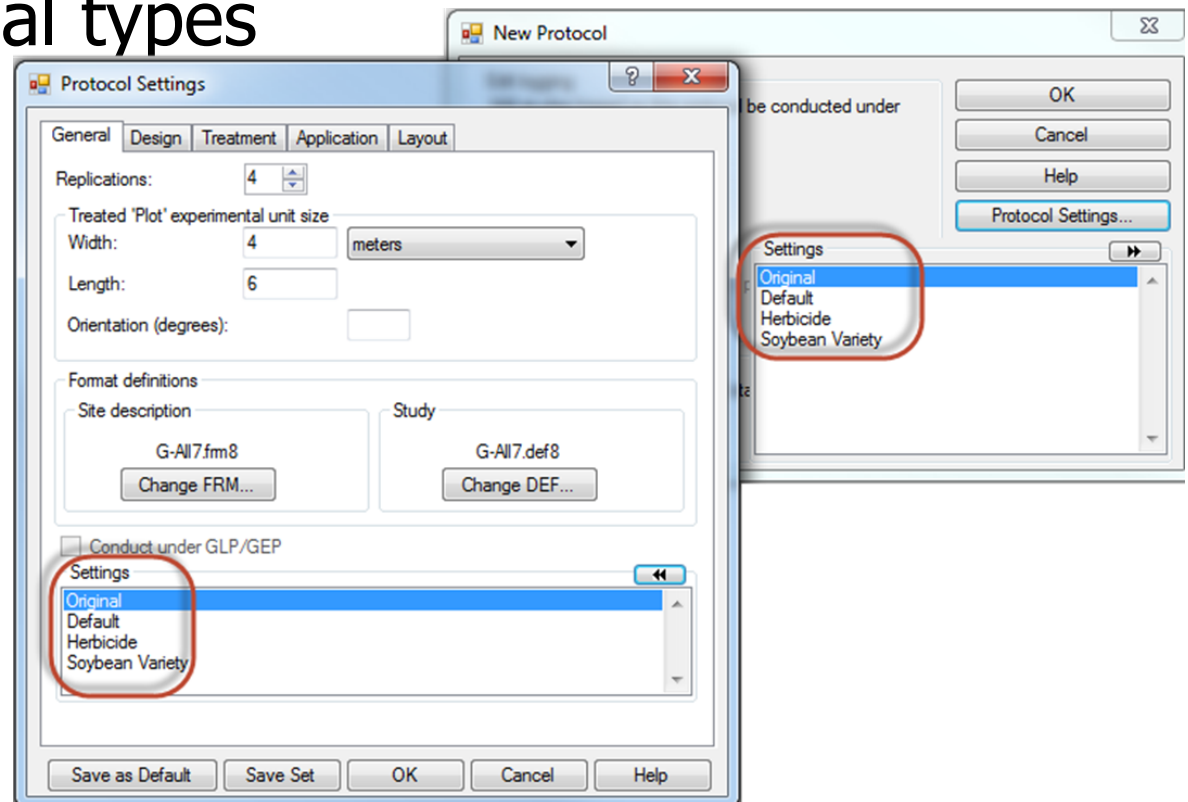
ARM 2015 Features



Gylling Data Management, Inc.

"New Protocol" Option Sets

- "Save Set" button to create appropriate defaults for different trial types
- Select set in New Protocol dialog or General tab of Protocol Settings





Power and Efficiency Planner, Plan Experiments to Have:

- A reasonable chance of distinguishing anticipated treatment differences
- The optimum number of replicates required to meet objectives
- An efficient experimental design and randomization for desired precision
- Cost-effective utilization of the available experimental area



Why is Planning Critical?

- Can reduce costs by selecting optimum number of replicates and samples
- Expected treatment differences are typically $< 10\%$, and frequently $< 5\%$, so small precision gains can help to:
 - Distinguish an actual treatment difference (reject null hypothesis H_0)
 - Strengthen evidence of no treatment diff.) (do not reject null hypothesis H_0)

Power and Efficiency Planner

Protocol Settings

General Design Treatment Application Layout

Randomized Complete Block (RCB)

Factors: 1

Treatments Merge Factor fields to

A: [] 5 [] Do not merge []

B: [] [] Do not merge []

C: [] [] Do not merge []

The Treatment editor Type column (field) uses the factor description entered above as the default entry.

Clear

Power and Efficiency

CV 10.0 Reps 4 Power 80 α SL 5% % Mean Diff 10.0

Lock at [] [] [] [] []

CV	Reps	Power	α SL	% Mean Diff	Error DF	'Plot' EUs
3.83	3	80	5%	10	8	15
4.63	4				12	20
5.3	5				16	25
5.9	6				20	30
6	7				24	35
6.9	8				28	40
8	11				40	55
10	17				64	85
12	24				92	120
14	32				124	160



Power and Efficiency Planner

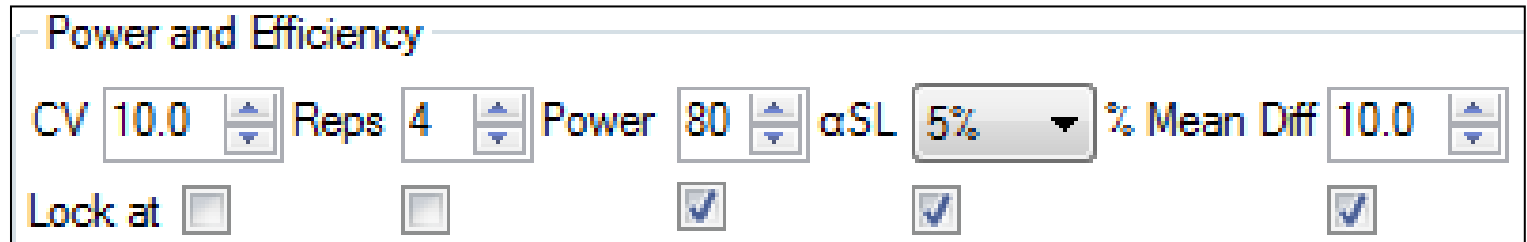
- Help plan experiments that successfully detect expected treatment differences
- Available in both protocols and trials so:
 - Protocol writers can more effectively plan experiments
 - Trialists can verify whether CV expectations are realistic based on local experience for specified crop(s)



Power and Efficiency Planner

- Calculates "power" based on:
 - Estimated CV of key assessment (e.g. yield)
 - Number of replicates
 - Power = Level of certainty to detect "real" treatment effects (80% or 90%)
 - Alpha Significance Level (e.g. 5%, 10%)
 - % Mean Diff = estimated treatment effect, expressed as percentage of overall (grand) mean across treatments of key assessment

Power and Efficiency Planner



Power and Efficiency

CV 10.0 Repts 4 Power 80 αSL 5% % Mean Diff 10.0

Lock at

- "Lock at" to keep 3-4 columns constant
- Calculates table of possible values for "unlocked" columns (e.g. Rep or CV)
- Values entered by protocol writer are carried into trials created from protocol, conveying protocol expectations

Power and Efficiency Planner

- Compare effect of significance level on minimum replicates for a CV

Power and Efficiency

CV 10.0 Reps 4 Power 80 OSL 5% % Mean Diff 10.0

Lock at

CV	Reps
4.37	3
5.05	4
5.64	5
6.2	6
7.14	8
6	6
8	11
10	16
12	23
14	31

Power and Efficiency

CV 10.0 Reps 4 Power 80 OSL 10% % Mean Diff 10.0

Lock at

CV	Reps	Power	OSL	% Mean Diff
4.93	3	80	10%	10
5.7	4			
6.36	5			
7	6			
8.04	8			
6	5			
8	8			
10	13			
12	18			
14	25			

Power and Efficiency Planner

- Consider impact of Replicates on precision to detect treatment differences

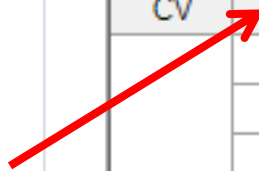
Power and Efficiency

CV 5.0 Reps 4 Power 80 α SL 5% % Mean Diff 5.0

Lock at

CV	Reps	Power	α SL	% Mean Diff	Error DF	'Plot' EUs
5	3	80	5%	13	8	15
	4			10.8	12	20
	5			9.4	16	25
	6			8.5	20	30
	8			7.26	28	40
	9			7	32	45
	12			6	44	60
	17			5	64	85
	26			4	100	130
	45			3	176	225

Click on column heading to sort





Randomization Quality Review

Goal is to improve experiment precision:

1. Arrange replicates as squares, not strips
2. Equalize treatment distribution
 - a. Balance average distance from all other treatments
 - b. Balance “Edge effect” across treatments
3. Randomize all replicates

Trial Map

75%

Properties

- Color by
 - Replicate
 - Treatment
 - Current Treatment
- Auto-select for move
 - Treatment
 - 'Plot' Experimental Unit
 - Replicate

Treatment

Trt	Code	At Edge	Ave Dist.	StDev	Min	Max
1	CHK	3	79	18.6	40.4	121
2		3	96	26.2	40.4	128
3		2	76.5	26.6	19.1	128
4		3	86	24.6	46.8	138
5		2	82	20.0	46.8	117
6		2	69	21.0	38.3	106
7		2	67	13.9	49	102
8		2	68	18.2	27.6	102
9		2	66	25.6	19.1	117
10		2	64.7	23.2	25.5	117
11		2	69	19.2	27.6	104
12		2	66	21.8	25.5	106
13		2	61	22.3	25.5	125
14		2	56	17.6	21.3	89
15		2	67	22.8	32	125
16		2	64.7	22.3	27.6	123
17		2	71.5	24.0	27.6	113
18		2	67	25.0	27.6	110
19		2	60.6	19.2	21.3	102
20		2	63	24.2	27.6	125
21		2	79	27.4	25.5	128
22		2	69	27.0	14.9	121
23		2	70	26.0	14.9	110
24	REF	3	27.7	38.3	138	

Options | Movement Arrows | Treatment Description | Comment | **Quality**

Suggested block size (*=optimum):

Block Size	6	8*	12	24
Rep Width	50.5	67.5	101.5	203.5
Rep Length	103	77	51	25
Surface/Area	0.059	0.056*	0.059	0.090
Trial Width	50.5	67.5	101.5	203.5
Trial Length	415	311	207	103
Unused 'Plot'	0	0	0	0

Replicate shape

Replicate 1 is defined as non-randomized. It is best statistical practice to randomize all replicates.

1

3

a

b

Settings... | Re-Randomize | Re-Number 'Plots' | | Cancel | Help

Arrange Replicates as Squares not Strips

“Optimum” is smallest surface-to-area ratio

Options	Movement Arrows	Treatment Description	Comment	Quality
Suggested block size (*=optimum):		<input type="button" value="Apply"/>		
Block Size	6	8*	12	24
Rep Width	50.5	67.5	101.5	203.5
Rep Length	103	77	51	25
Surface/Area	0.059	0.056*	0.059	0.090
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Rep Length	103	77	51	25
Surface/Area	0.059	0.056*	0.059	0.090
Trial Width	50.5	67.5	101.5	203.5
Trial Length	415	311	207	103

Equalize Treatment Distribution

“Undesirable” layout of 7 treatments and 5 replicates in Randomized Complete Block:

- Trt. 6 in middle 3 columns of all reps
- Trt. 5 in right 2 cols for all but one plot

2e	4e	7e	1e	6e	3e	5e
1d	7d	3d	4d	6d	2d	5d
7c	5c	4c	6c	2c	3c	1c
2b	1b	3b	6b	7b	5b	4b
7a	2a	6a	3a	4a	1a	5a

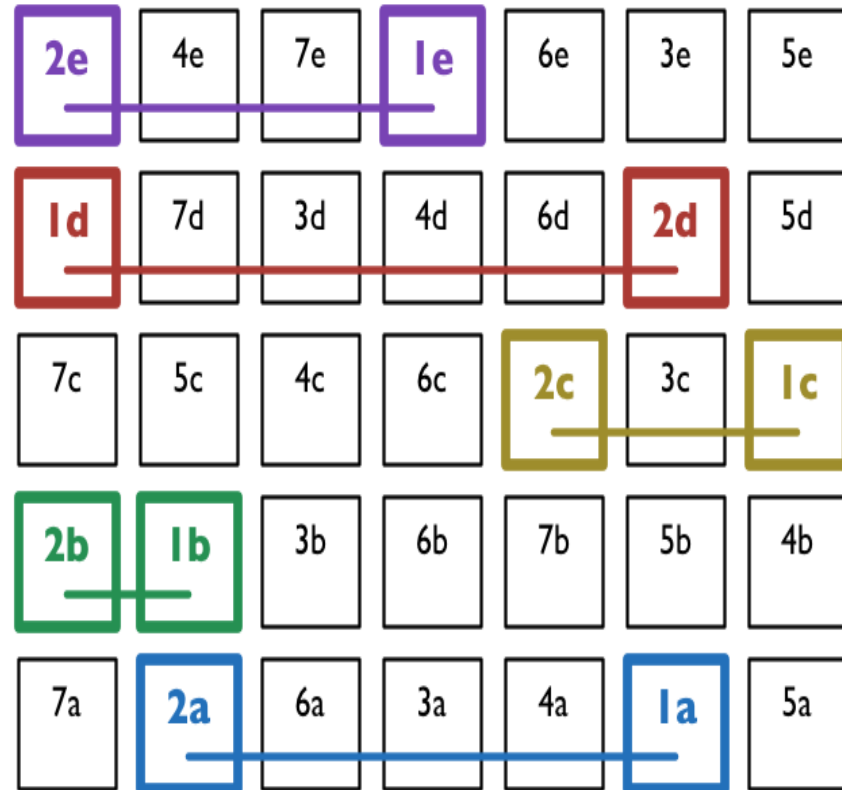


Uses “Average Distance of Treatment” Comparison (ATDC)

- van Es and van Es, “Spatial Nature of Randomization and Its Effect on the Outcome of Field Experiments”, *Agronomy Journal*, 85:420-428 (1993).
- Comparison between treatments 1 and 2 is taken from 5 plots for each treatment.
- Measure the plot-to-plot distance for each plot containing treatment 1 to the paired plot within replicate containing treatment 2, for a total of 5 distances.
- ADTC for the treatment pair 1-2 is the average of the 5 distances.

Distances, Treatments 1-2

- Average distance = 3 plots = 24 feet for 8 foot wide plots



Unequal Treatment Distribution

- Average distance from 17.9 to 24.6
- Ranges from 11.9(T3,T6) to 34(T2,T5)
- Error variances for treatments may not be homogeneous



Trt	At Edge	Ave Dist.	StDev	Min	Max
1	4	24.4	6.24	13.6	32.3
2	3	24.6	5.56	17	34
3	2	19.8	5.66	11.9	25.5
4	3	21.3	3.18	17	25.5
5	3	27	5.83	20.4	34
6	2	17.9	3.53	11.9	22
7	3	23.8	4.3	18.7	29

Unbalanced "Edge effect"

- Treatment 1 occurs at edge 4 times, T2 and T3 at edge only 2 times

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

Trt	At Edge	Ave Dist.	StDev	Min	Max
1	4	24.4	6.24	13.6	32.3
2	3	24.6	5.56	17	34
3	2	19.8	5.66	11.9	25.5
4	3	21.3	3.18	17	25.5
5	3	27	5.83	20.4	34
6	2	17.9	3.53	11.9	22
7	3	23.8	4.3	18.7	29

Properties

Color by

Replicate

Treatment

Current Treatment

Auto-select for move

Treatment

'Plot' Experimental Unit

Replicate

Balanced Treatment Distribution and Edge Effect

- Average distance from 21.3 to 24.4
- Distances range from 18.7 to 27.2
- “Edge effect” is balanced



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

Trt	At Edge	Ave Dist.	StDev	Min	Max
1	2	22	2.15	20.4	25.5
2	3	23.8	3.57	18.7	27.2
3	3	24.4	1.76	22	27.2
4	3	22.4	3.47	18.7	25.5
5	3	22	3.4	18.7	27.2
6	3	21.3	2.58	18.7	25.5
7	3	22.7	2.56	18.7	25.5

Randomize All Replicates

- This frame displays when a non-randomized replicate is defined in Settings
- Select “Randomize All Replicates” to follow recommended statistical practice

Options Movement Arrows Treatment Description Comment Quality

Suggested block size (*=optimum):

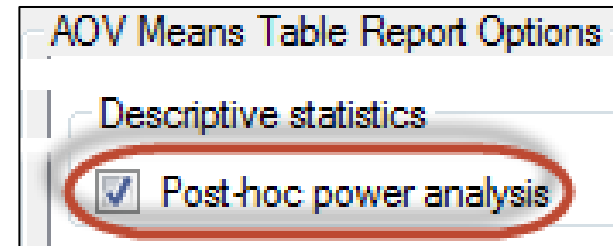
Block Size	6	8*	12	24
Rep Width	50.5	67.5	101.5	203.5
Rep Length	103	77	51	25
Surface/Area	0.059	0.056*	0.059	0.090

Replicate shape

Replicate 1 is defined as non-randomized. It is best statistical practice to randomize all replicates.

Post-hoc Power Analysis

- Optional descriptive statistic on AOV Means Table report
- Lists, for each assessment column, the minimum number of replicates required to statistically separate treatment means based on Treatment P(F) and current significance level
- Use for planning future trials



Post-hoc Power Analysis

- In example, LSD can distinguish 25% mean difference (largest existing difference is 18%)
- Current AOV Trt P(F) is 0.2979, so use 0.30+ significance level to separate treatment means
- Need 8+ replicates to reject null hypothesis at 0.05 significance

Crop Variety	CEZANNE
Trt No.	24
	2 85.33 a
	3 81.67 a
	4 98.00 a
	5 95.33 a
LSD P=.05 (% mean diff)	21.808 (25%)
Standard Deviation	10.915
CV	12.12
Grand Mean	90.083
Minimum Replicates (power = 80)	8
Largest Mean Difference (% mean diff)	16.333 (18%)
Treatment F	1.541
Treatment Prob(F)	0.2979

Factorial AOV Report Options

- “Analysis method” options:
 - Least squares analysis (like SAS GLM)
 - Print adjusted means (if missing data)

Factorial AOV Table Report Options

Report Options | General Summary | Report Preview

Mean comparison test

Test: Tukey's HSD

Significance or alpha level: 5%

Only when significant AOV treatment P(F)

Symbol indicating no significant difference between treatment means: -

Adjusted treatment mean

Use adjusted mean as primary mean

Descriptive statistics for each factor mean section

LSD (or HSD if Tukey's)

Standard Deviation

Coefficient of Variation

AOV tables to print

Complete

Pooled error

Both

Analysis method

Traditional AOV

Least square estimation

Factorial AOV Report Options

"Include descriptive statistics for each Factor means section" adds Descriptive statistics under each "Table of X" section:

- LSD (or Tukey's HSD)
- Standard Deviation
- CV

Rating Date	Apr-22-2014	
Rating Type	CONTRO	
Rating Unit	%	
Trt-Eval Interval	7 DA-A	
Trt No.	Treatment Name	Rate Rate Unit
		1
TABLE OF A (Herbicide) MEANS		
1	Accord	53.5 b
2	Brominal PLUS	72.0 a
3	Cannon	51.3 c
LSD P=.05		0.76
Standard Deviation		0.76
CV		1.29
TABLE OF B (Rate) MEANS		
1	Rate 1	1 LB A/A 45.0 b
2	Rate 2	1.5 LB A/A 61.8 a
3	Rate 3	2 LB A/A 70.0 a
LSD P=.05		12.74
Standard Deviation		15.05
CV		25.54
TABLE OF A (Herbicide) B (Rate)		
1	Accord	26.9 a
1	Rate 1	1 LB A/A
2	Brominal PLUS	61.3 a
3	Rate 3	2 LB A/A
3	Cannon	55.8 a
3	Rate 3	2 LB A/A
LSD P=.05		22.07
Standard Deviation		15.05
CV		25.54

Study Rules

- Selectively hide protocol or site description fields according to person who opens study (based on ARM license information):
 - From everyone else
 - From everyone who is not in my company

Condition

If not in my company

If not me

If not in my company



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



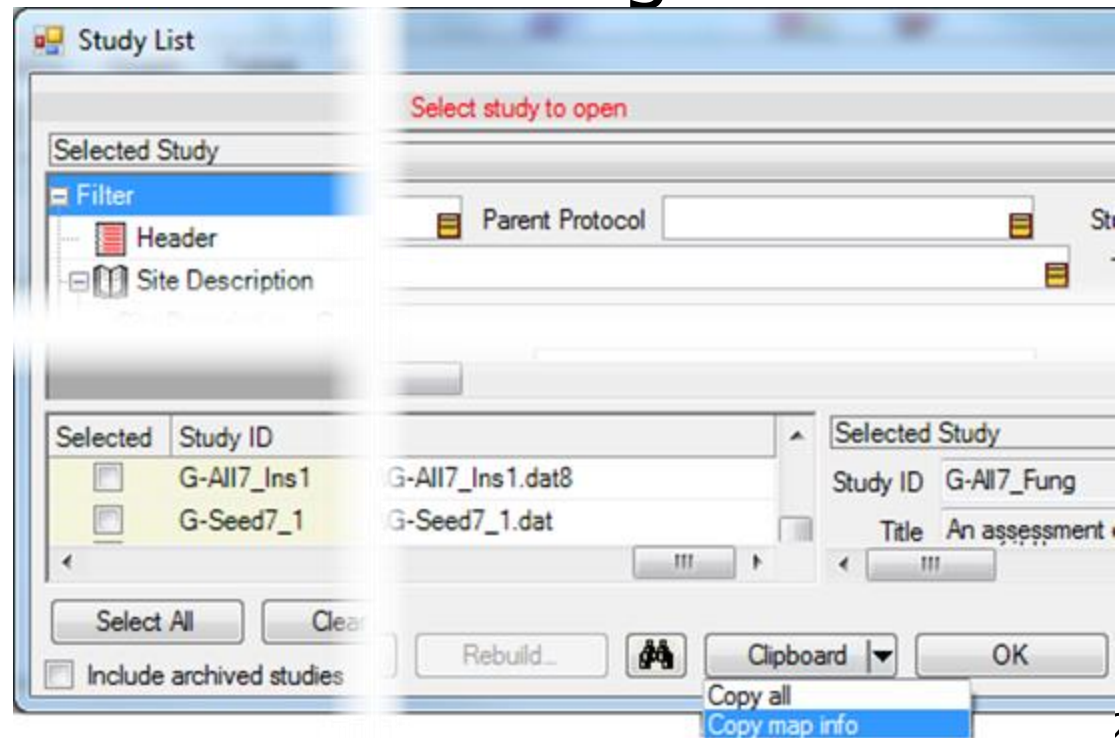
Study Rules

- Examples of new study rules:

Study Rules				
Rule	Rule ID	Editor	Field	Condition
1	Required	Header	Trial Number	Lock field to prevent edits
2	Limit validation list	Assessment Data Header	Crop & Pest in Site Description	Always
3	Lock Trial ID as position 1	Assessment Data	Image Attachments	Always
4	Strict Validation	Treatments		
5	Required	Trial	Image Attachments	One or more Plots
6	Hidden Field	Protocol Description	Trial Establishment Guidelines - Responsible	If not in my company

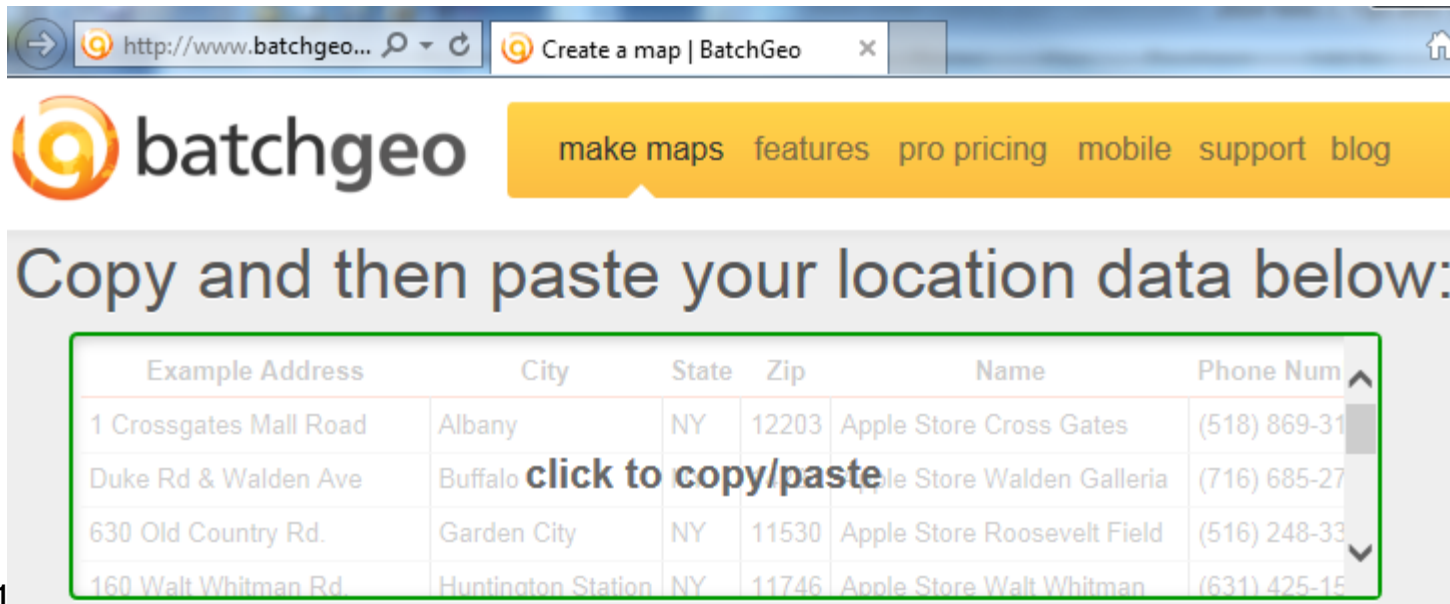
Map Trials from Study List 1 of 3

- Select trials of interest
- Copy map latitude and longitude to clipboard



Map Trials from Study List 2 of 3

- ARM opens batchgeo.com website
- Right-click in batchgeo.com location grid, and then paste



The screenshot shows a web browser window with the URL <http://www.batchgeo.com>. The page features the batchgeo logo and a navigation menu with links for "make maps", "features", "pro pricing", "mobile", "support", and "blog". Below the navigation is a heading that reads "Copy and then paste your location data below:". Underneath this heading is a table with a green border. The table has six columns: "Example Address", "City", "State", "Zip", "Name", and "Phone Num". The table contains four rows of data, with the second row highlighted. A text overlay "click to copy/paste" is positioned over the second row. A vertical scrollbar is visible on the right side of the table.

Example Address	City	State	Zip	Name	Phone Num
1 Crossgates Mall Road	Albany	NY	12203	Apple Store Cross Gates	(518) 869-31
Duke Rd & Walden Ave	Buffalo	NY	14203	Apple Store Walden Galleria	(716) 685-27
630 Old Country Rd.	Garden City	NY	11530	Apple Store Roosevelt Field	(516) 248-33
160 Walt Whitman Rd.	Huntington Station	NY	11746	Apple Store Walt Whitman	(631) 425-15

Map Trials from Study List 3 of 3

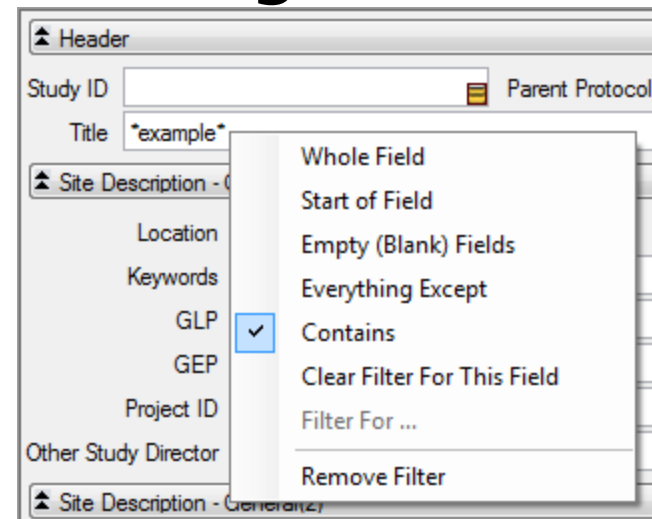
- Select "Map Now" button

Map Now



Study List Filter Form

- Clicking into a field on filter form automatically scrolls lower grid to the matching column
- Right-click menu
- Automatically save Study List filters the client has applied



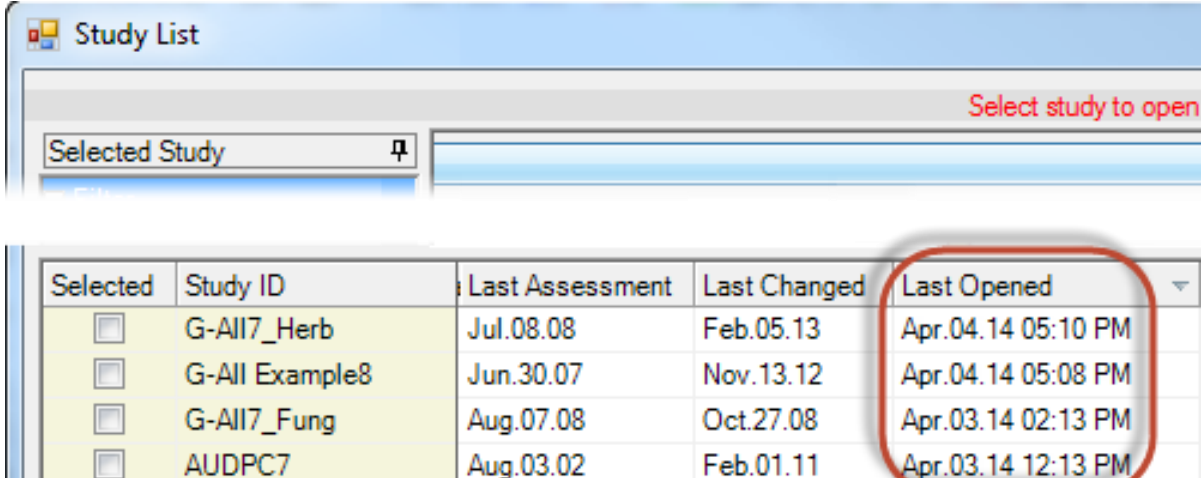
Study List Filter Form

■ Right-click menu

The screenshot displays the 'Study List Filter Form' interface. The form is organized into sections: 'Header', 'Site Description - General(1)', and 'Site Description - General(2)'. The 'Header' section includes fields for 'Study ID', 'Parent Protocol', and 'Title' (containing the text 'example'). The 'Site Description - General(1)' section includes fields for 'Location', 'Keywords', 'GLP', 'Investigator', 'GEP', 'Study Director', 'Project ID', and 'Other Study Director'. The 'Site Description - General(2)' section includes fields for 'Technician', 'Other Investigator', and 'Trial Location City'. A right-click context menu is open over the 'Title' field, showing options such as 'Whole Field', 'Start of Field', 'Empty (Blank) Fields', 'Everything Except', 'Contains' (which is selected with a blue checkmark), 'Clear Filter For This Field', 'Filter For ...', and 'Remove Filter'. Below the menu, there are radio buttons for 'All', 'Trials' (selected), and 'Protocols', a 'When was it modified?' dropdown set to 'Don't remember', and a 'Filter (Title)' section with radio buttons for 'Whole Field', 'Start of field', 'Empty (Blank) Fields', 'Everything Except', 'Contains' (selected), 'Clear Filter for this Field', and 'Filter For ...'. At the bottom, there are 'From:' and 'To:' input fields. The 'Active Filter (19):' section at the bottom right shows the current filter settings: 'Active Studies', 'Study Type is 'Trial'', and 'Title contains 'example''. A red arrow points from the 'Title' field to the 'Contains' option in the menu.

Study List, Recently Changed

- 'Last Opened' column in study list includes time
- Most recent study is always the top row until default sort order is changed



The screenshot shows a window titled "Study List" with a search bar and a table. The table has the following data:

Selected	Study ID	Last Assessment	Last Changed	Last Opened
<input type="checkbox"/>	G-All7_Herb	Jul.08.08	Feb.05.13	Apr.04.14 05:10 PM
<input type="checkbox"/>	G-All Example8	Jun.30.07	Nov.13.12	Apr.04.14 05:08 PM
<input type="checkbox"/>	G-All7_Fung	Aug.07.08	Oct.27.08	Apr.03.14 02:13 PM
<input type="checkbox"/>	AUDPC7	Aug.03.02	Feb.01.11	Apr.03.14 12:13 PM



New Study List Fields

- Treatment Type (TTT)
- Treatment Form. Type (TFD)
- Treatment Growth Stage (TGI)
- Assessment Part Rated (ECP)
- Assessment Rating Type (EDT)
- Assessment Rating Unit (ERU)
- Crop Group (KF)
- Pest Type (~P)
- Pest Stage Majority (PS)
- Previous Crop (PC)
- Trial Region (~R)
- Reliability (TQ)
- Study Design (ED)
- Trial Usage/Type (VU)
- Application Soil Moisture (SM)
- Rainfall/Irrigation Type (RT)
- Application Equipment (SZ)
- Nozzle Type (NT)
- Carrier (DC)
- Propellant (TP)

Report Options

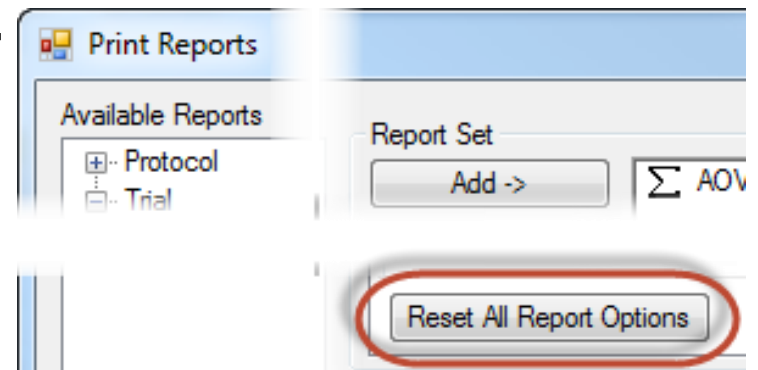
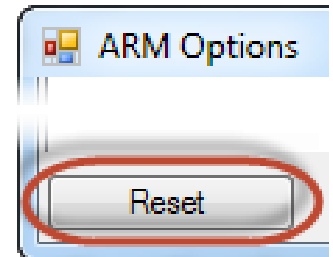
- Directly set report options on option tab - simple and intuitive

The screenshot shows the 'Print Reports' dialog box. On the left, a tree view lists 'Available Reports' including Protocol, Signs, Site Description, Spray/Seeding Plan, Status Report, Summary, Assessment Data Summary, AOV Means Table, Factorial AOV Table, Correlations, Dose-Response Analysis, Standardized Summary, Tour Report, Treatment LST Comments, Trial Audit Trail, Trial Comments, Trial Map, and Trial Treatments. On the right, the 'Report Set' section is active, showing the 'Report Options' tab. This tab contains several sections: 'List product amount totals...' and 'List other settings' (both checked), 'Treatments' (with 'List ingredients for pre-mixes...' checked and 'List validation comments' unchecked), and 'Multi-factor View' (with radio buttons for 'Factors and levels', 'From entered fields in the original protocol' (selected), 'From first occurrence of each factor and level in trial', 'Treatments', and 'Both'). Buttons for 'Options...', 'Fields To Print...', and 'Options...' are visible next to the respective sections.

Separate Option Reset Buttons

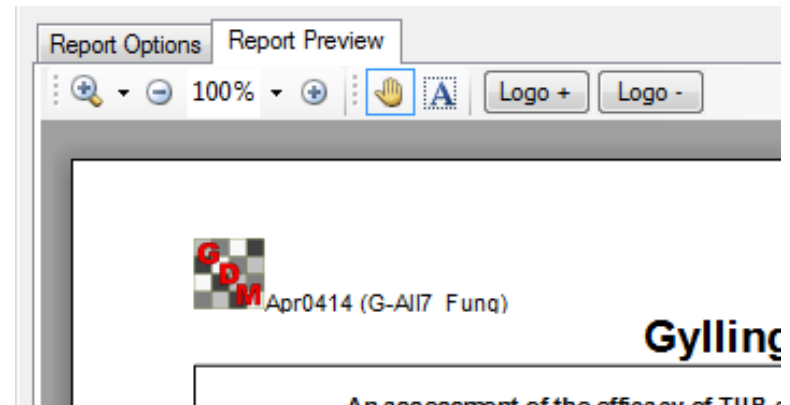
Separate "Reset" buttons for ARM Options and Report Options:

- Tools – Options: Reset program options to default settings without affecting your report changes
- Reset report options to default settings without changing other ARM program options



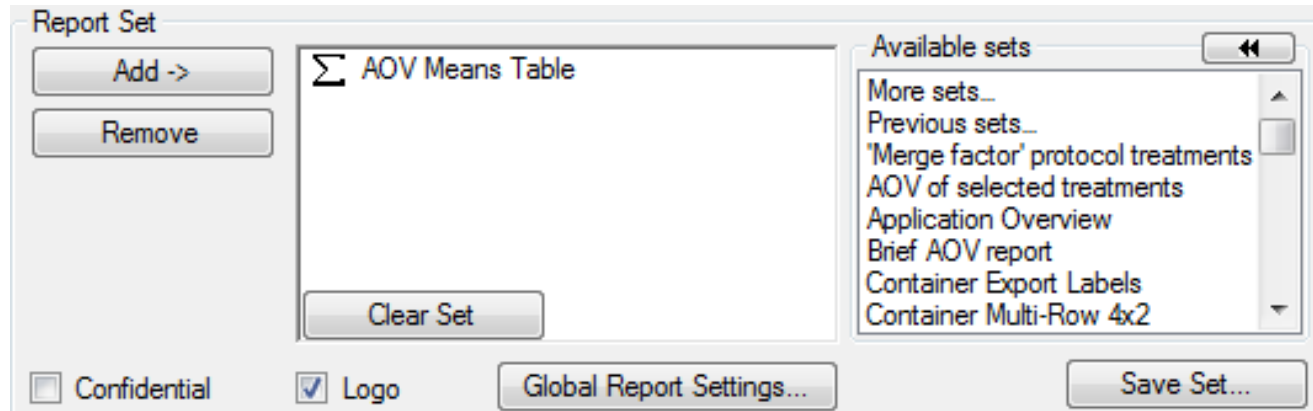
Report Preview

- Report Preview tab stays open
 - One-click preview of reports
 - Zoom in/out
 - Adjust logo size
 - Quickly find a label by clicking through list of available labels



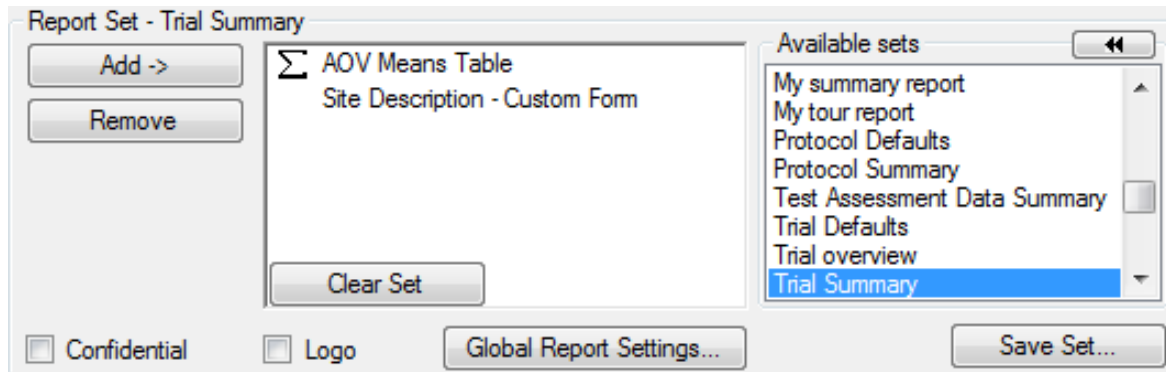
Report Sets

- New list box displays available sets
 - Click once to select a set from list
 - “More sets” to browse
 - Shows lists across all language subfolders

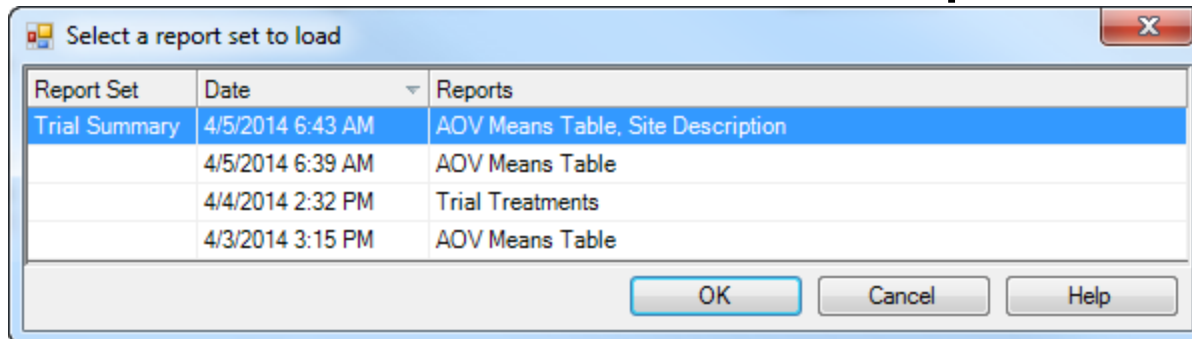


Report Sets

- Last selected set highlighted by default

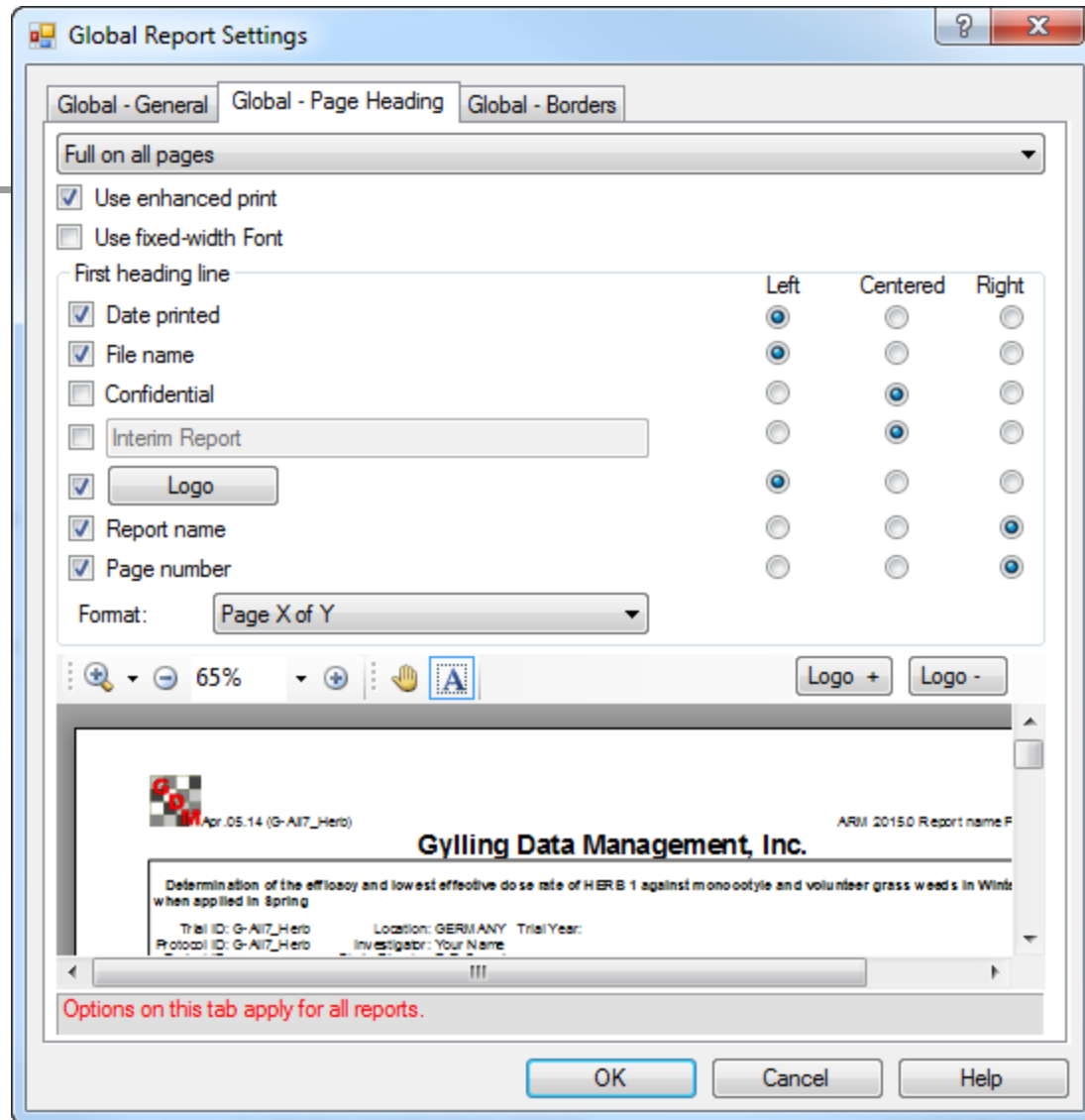


- "Previous sets" shows the report history



Page Heading

- Customize arrangement
- Simple way to add a logo and adjust logo size and position on report





Help for AOV Means Table

New "Interactive AOV Means Table Report" help topic shows which options control various parts of the report

Interactive AOV Means Table Report

[How does this work?](#)

Aug-1-2014 (InteractiveAOV)  ARM 2015.0 AOV Means Table Page 1 of 3 Gylling Data Management, Inc.									
An assessment of the efficacy of TUB and other fungicides for the control of Septoria Diseases in winter wheat									
Trial ID: InteractiveAOV Protocol ID: Interactive Project ID:		Location: Gembloux Investigator: Your Name Study Director: R.E. Search		Trial Year: 					
Pest Type		D Disease	D Disease	D Disease	D Disease				
Pest Code	TRZAW	SEPTTR	SEPTTR	ZZXXEE	ZZXXEE				
Crop Code	TRZAW	TRZAW	TRZAW	TRZAW	TRZAW				
Crop Name	Winter wheat	Winter wheat	Winter wheat	Winter wheat	Winter wheat	Winter wheat			
Part Rated	LEAF2 P	LEAF2 P	LEAF2 P	LEAGRE P	LEADIS -	GRAIN C			
Rating Date	May-2-2008	Jul-2-2008	Jul-2-2008	Jul-15-2008	Aug-7-2008	Aug-7-2008			
Rating Type	PESSEV	PESSEV	PESSEV	AREA	AREA	YIELD			
Rating Unit	%	%	%UNCK	%AREA	%AREA	KG			
Number of Subsamples	1	1	1	1	1	1			
ARM Action Codes			TAB[2]	AL	ET1				
Number of Decimals	1	2	2	2	2	2			
Trt No.	Treatment Name	Rate	Rate Unit	1	2	3	4	5	6
1	Untreated Check			11.7 -	15.51 a	0.00 c	2.31 b	32.88	7.55 b
2	TUB	0.5 l/ha		11.6 -	1.74 b	88.74 ab	21.58 a	4.53 bc	8.20 a
3	TUB	1 l/ha		12.2 -	0.83 b	95.62 a	28.98 a	3.93 c	8.16 a
4	TILT 250	0.5 l/ha		12.1 -	2.35 b	85.11 ab	27.82 a	8.59 a	8.20 a
5	MICO 60 FUNGOL	1.5 l/ha 1.25 l/ha		12.5 -	3.88 b	74.08 b	11.46 a	5.13 b	8.16 a
LSD (P=.05)				1.46	3.146	12.747	0.435t	0.830	0.360
Standard Deviation				0.95	2.042	8.273	0.282t	0.509	0.233
CV				7.86	42.0	12.04	23.91	9.19	2.9
Bartlett's X2				8.56	10.194	6.96	6.687	4.22	2.316
P(Bartlett's X2)				0.073	0.037*	0.073	0.153	0.239	0.678
Skewness				2.0681*	1.7361*	-1.3261*	-0.7822	1.2312*	0.1737
Kurtosis				5.3045*	2.3213*	0.1148	-0.6432	0.3684	-0.5835
Replicate F				0.945	4.361	2.117	0.673	0.842	22.649
Replicate Prob(F)				0.4494	0.0270	0.1515	0.5849	0.5083	0.0001
Treatment F				0.695	35.181	89.772	8.017	67.461	5.873
Treatment Prob(F)				0.6094	0.0001	0.0001	0.0022	0.0001	0.0074

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)
 t=Mean descriptions are reported in transformed data units, and are not de-transformed.
 Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.
 Missing data estimates are included in columns: Yates=5

Help for AOV Means Table

For example, click on treatments in help topic for options on treatments and treatments fields on report

Interactive AOV Means Table Report

[How does this work?](#)

Aug-1-2014 (Inter

An assessment

Trial ID: Inter
Protocol ID: Inter
Project ID:

Pest Type
Pest Code
Crop Code
Crop Name
Part Rated
Rating Date
Rating Type
Rating Unit
Number of Subst
ARM Action Code
Number of Decim

Trt	Treatment No.	Name
1	Untreated C	
2	TUB	
3	TUB	
4	TILT 250	
5	MICO 60 FUNGOL	

LSD (P=.05)
Standard Deviat
CV
Bartlett's X2
P(Bartlett's X2)
Skewness
Kurtosis

Replicate F
Replicate Prob(F
Treatment F
Treatment Prob(f

Means followed b
t=Mean descripti
Mean comparison
Missing data estim

Can I print only certain treatments?

When the **Print Selected** option on the **Global - General** settings dialog is selected, ARM will prompt the user to specify which treatment numbers to include when printing one or more reports. From the **Print Reports** dialog, select the **Global Report Settings** button in the **Report set** section to display this dialog.

Global Report Settings

Global - General Global - Page Heading Global - Borders

Treatments

Print all Print selected

Identify when selected treatments are summarized

Print rate units in lower case

Print active ingredient rate units as 'AI'

Force Form Conc to %AW/W basis (requires density)

Synonym number: 0

Alternatively, there are a couple of [ARM Action Codes](#) available to exclude a particular treatment from analysis, while still reporting the treatment mean on the AOV Means Table report.

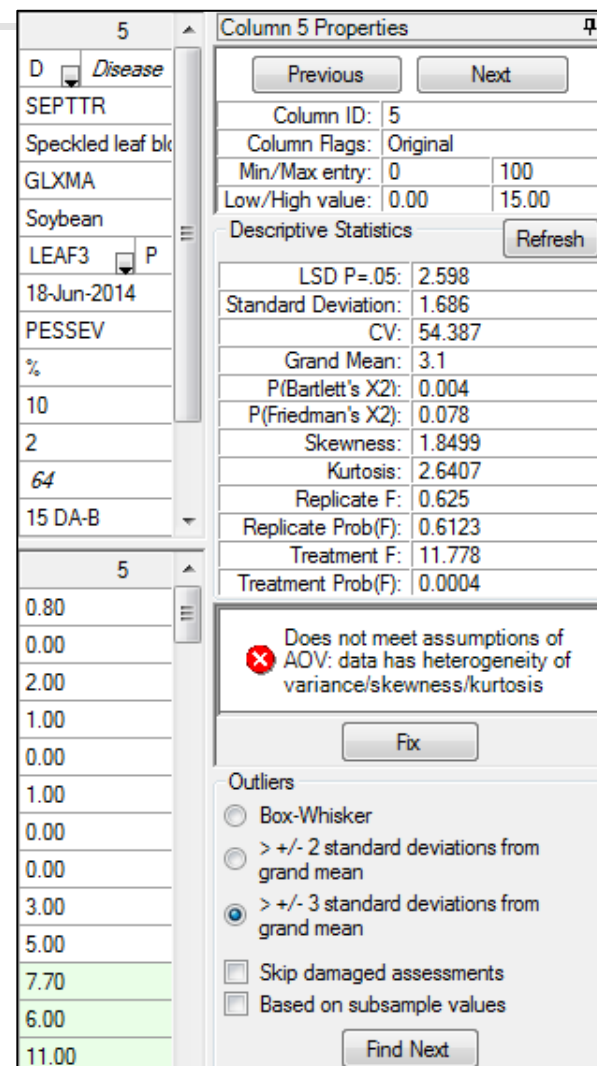
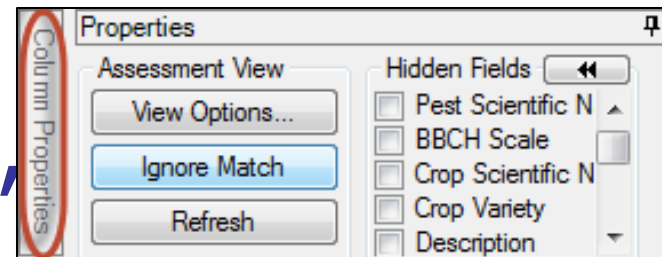
- The code **ES** will remove the untreated check treatment, as specified in the **Untreated treatments** setting on the [Treatment tab](#) of the Settings dialog, from the analysis.
- The code **ETn** will remove treatment **n** from the analysis, while still reporting the treatment mean on the report.

See Also

- See [Global Report Settings - General Tab](#) for more information about the General Global report settings.
- See [Selecting Treatments](#) for information about selecting treatments when printing a report in ARM.
- See [ARM Action Codes](#) for information about the non-analyzable data action codes.

Assessment Data "Column Properties"

- New editor panel
- Presents analysis of the current data column
- Fix violations of AOV assumptions
- Find statistical outliers



Assessment Data

“Column Properties”

- Column navigation
- Column description
- Min, Max, Range
- Transformation formula description
- Click “Refresh” to update after changing current data column

Column 5 Properties		
<input type="button" value="Previous"/> <input type="button" value="Next"/>		
Column ID:	5	
Column Flags:	Original, Changed, ARM action code changed	
Min/Max entry:	0	100
Low/High value:	0.00	15.00
Formula AL:	LOG([5]+ 1)	
<input type="button" value="Refresh"/>		

Assessment Data

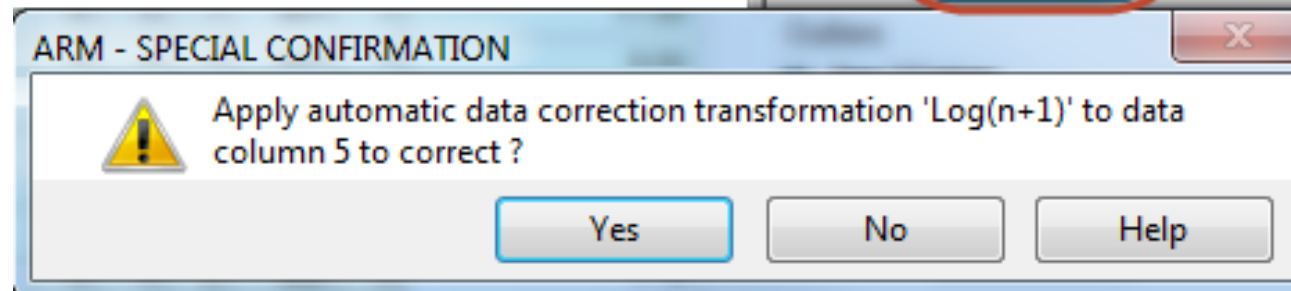
“Column Properties”

- Descriptive statistics from full AOV of data
- Displays violations of AOV assumptions
- “Fix” prompts if can resolve violations

LSD P=.05:	2.598
Standard Deviation:	1.686
CV:	54.387
Grand Mean:	3.1
Bartlett's X2:	15.5
P(Bartlett's X2):	0.004
Friedman's X2:	8.4
P(Friedman's X2):	0.078
Skewness:	1.8499
Kurtosis:	2.6407
Replicate F:	0.625
Replicate Prob(F):	0.6123
Treatment F:	11.778
Treatment Prob(F):	0.0004

✘ Does not meet assumptions of AOV: data has heterogeneity of variance/skewness/kurtosis

Fix



Assessment Data

“Column Properties”

- Search for outliers in current data column using a standard outlier test
- “Find Next” locates each statistical outlier
- “Damaged” drop from outlier test and AOV

The screenshot displays a data column with the following values: 9.5, 15.00, 10.00, 8.00, 5.50, 7.90, 8.00, 7.00, 12.00, 15.00, and 1.90. The value 9.5 is highlighted in blue. A dialog box is open, displaying a warning: "Does not meet assumptions of AOV: data has heterogeneity of variance/skewness/kurtosis". Below the warning is a "Fix" button. The "Outliers" section is active, with the following options: "Box-Whisker" (unselected), "> +/- 2 standard deviations from grand mean" (selected), and "> +/- 3 standard deviations from grand mean" (selected). There are also checkboxes for "Skip damaged assessments" (checked) and "Based on subsample values" (unchecked). A "Find Next" button is located at the bottom of the dialog. To the right of the dialog is an "Assessment Map" panel with a "Treatment" section containing a "Display current treatment" checkbox (unchecked), and an "Assessment (Plot 205, Col 5)" section with a "Comment:" field, a "Barcode:" field, a "GPS:" field, and a "Damaged" checkbox (unchecked).

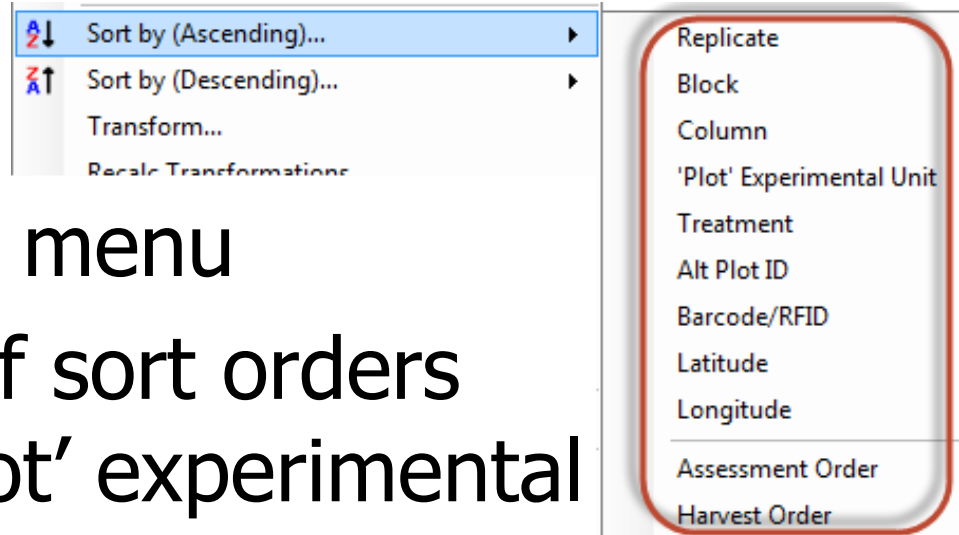
New Assessment Sorts

- Sort data by any 'plot' experimental unit description column
- Click heading once for ascending sort, click again for descending sort

+ Sub	Rp	Bk	Col	Plot	Tit	3
1	4	4	5	405	5	10.00
1	4	4	4	404	4	0.00
1	4	4	3	403	2	3.00
1	4	4	2	402	3	0.00
1	4	4	1	401	1	0.00
1	3	3	5	305	4	3.00
1	3	3	4	304	5	0.00
1	3	3	3	303	4	0.00

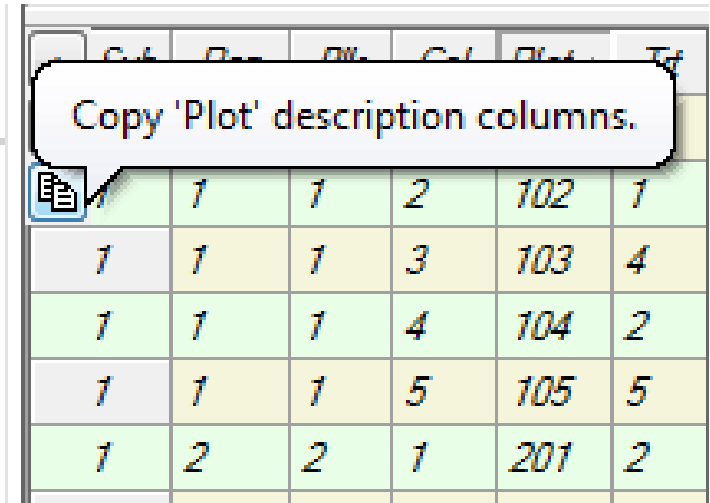
New Assessment Sorts

- New sorts are also on right-click menu
- Provides full list of sort orders from available 'Plot' experimental unit descriptors



Copy 'Plot' Assessment Unit Description

- New shortcut button in assessment editor
- Copies entire plot description, including column headings
- Simple transfer of ARM randomization to planting, application, or harvest software (shown pasted to Excel)



	Col	Plot	Trt		
1	1	1	2	102	1
1	1	1	3	103	4
1	1	1	4	104	2
1	1	1	5	105	5
1	2	2	1	201	2

	A	B	C	D	E
1	Rep	Blk	Col	Plot	Trt
2	1	1	1	101	3
3	1	1	2	102	1
4	1	1	3	103	4
5	1	1	4	104	2
6	1	1	5	105	5
7	2	2	1	201	2
8	2	2	2	202	3

Convert Yield using Harvested Plot Length/Width per Plot 9.2014

Assessment Data - Line 15

Column Number	10	11	12	13 (Calculated)	14 (Calculated)	15
Part Rated	PLOT <input type="checkbox"/> C <input type="checkbox"/>	GRAIN <input type="checkbox"/> C <input type="checkbox"/>	GRAIN <input type="checkbox"/> C <input type="checkbox"/>	GRAIN <input type="checkbox"/> C <input type="checkbox"/>	GRAIN <input type="checkbox"/> C <input type="checkbox"/>	
Rating Type	LENGTH <input type="checkbox"/>	YIELD <input type="checkbox"/>	MOICON <input type="checkbox"/>	YIELD <input type="checkbox"/>	YIELD <input type="checkbox"/>	
Rating Unit	m <input type="checkbox"/>	KG <input type="checkbox"/>	% <input type="checkbox"/>	T-MET <input type="checkbox"/>	%UNCK <input type="checkbox"/>	

Sub	Rep	Blk	Col	Plot #	Trt	Yield
1	1	1	1	101	3	9.00
1	1	1	2	102	7	9.00
1	1	1	3	103	4	9.00
1	1	1	4	104	2	9.00
1	1	1	5	105	5	9.00
1	2	2	1	201	2	8.50
1	2	2	2	202	3	8.50
1	2	2	3	203	5	8.50
1	2	2	4	204	4	8.50
1	2	2	5	205	7	8.50
1	3	3	1	301	3	9.00
1	3	3	2	302	2	9.00
1	3	3	3	303	7	9.00
1	3	3	4	304	5	9.00
1	3	3	5	305	4	9.00
1	4	4	1	401	7	9.00
1	4	4	2	402	3	9.00

Yield Conversion

Yield units
Current: Kilograms
Desired: Tonnes/Ha

Moisture adjustment
 Adjust to dry moisture percent = 15.0
Average moisture percent at harvest
 Use whole trial average percent =
 Use percent in data column number 12

Harvested plot size
Width: 1.1
 Use width in data column number 1
Length: 9
 Use length in data column number 10
Unit: meters

Conversion factor: 0.1

Convert data column number: 11

Automatic Mix Size Calculator

On Settings - Application tab, to calculate mix for all plots of 1 liquid treatment application select:

1. Volume unit
2. Mix unit
3. Overage to fill applicator lines per treatment + before/after plot

Trial Settings

General Design Treatment Application Layout

Application volume: 200 L/ha 1

Mix size

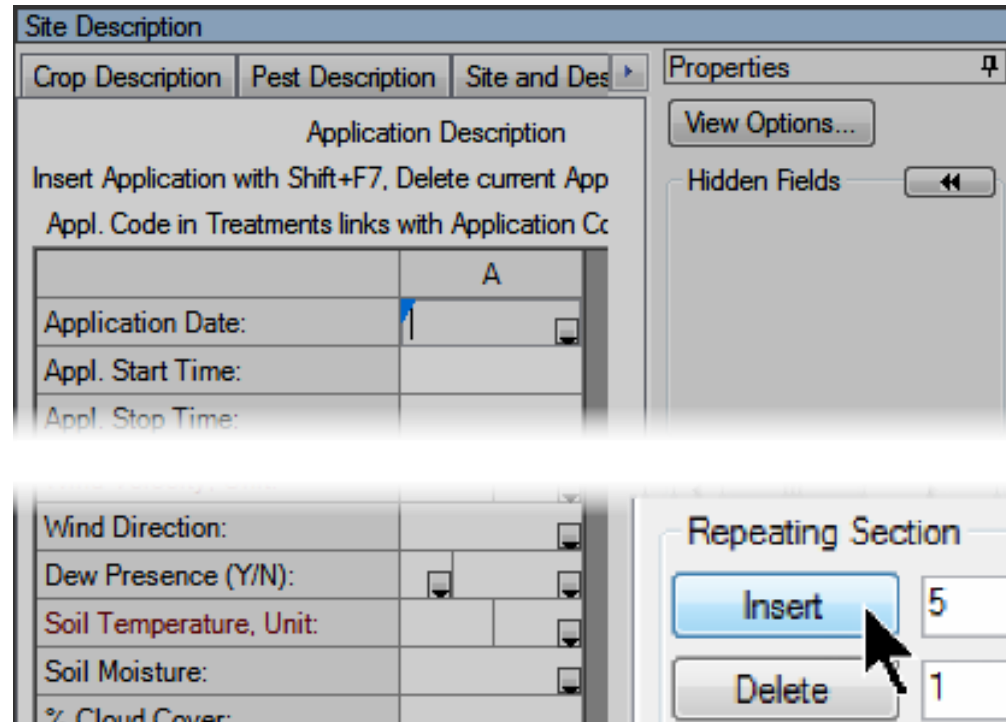
Treatments	1
Replications	4
'Plot' EU size	25 m2
Application volume	200 L/ha
Mix size unit	liters 2
Minimum	2 liters
Overage:	150 mL 3
Calculated mix size	2.15 liters
User-defined mix size	2.15 liters

2 liters based on 1 trts; 4 reps; 25 m2 'Plot' size; 200 L/ha volume

Insert or Delete Multiple Repeating Sections at Once

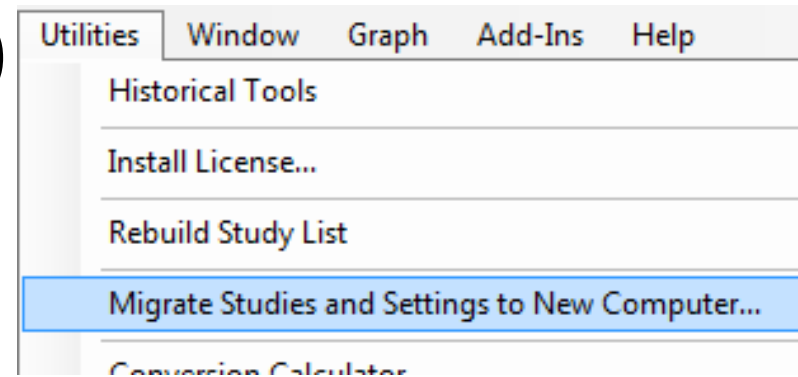
New option on Site/Protocol Description Properties panel

1. Define number to add or delete
2. Select 'Insert' or 'Delete' button



Assist Migration to a New PC

- Create migration package of original PC (in ARM 9.2014.2+) containing:
 - ARM studies
 - Personal lists
 - ARM and report options, report sets
 - ARMbackup folder contents (if package is stored on ARM's backup device)



Migration Wizard

- Select ARM version that will be installed on the new PC
- Select items to include in the package

Migrate Studies and Settings to New Computer

Are you migrating files to ARM 9 or ARM 2015?

ARM 9

ARM 2015 (or newer)

Note: Full migration is only supported for ARM 2015

Help Cancel < Back Next >

Migrate Studies and Settings to New Computer

Select which components to migrate to an ARM 2015 (or newer) computer.

Settings folder options

Personalization of study definition files

Study data files

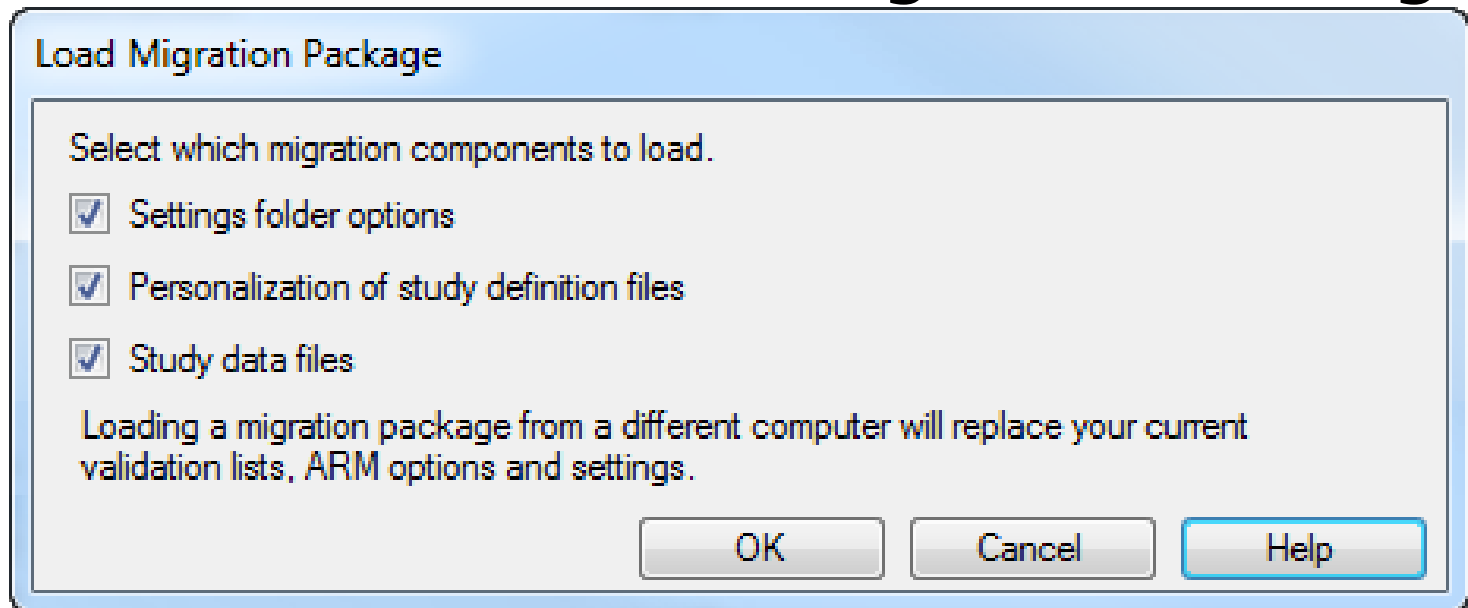
Migration files will be created in F:\ARMbackup\.

Help Cancel < Back Next > Finish

Import Migration in ARM 2015

On the new PC with ARM 2015, either:

- Use migration package when installing ARM
- Use Utilities menu "Load Migration Package"



'Create this Trial' in Protocol

- Right-click on row of trial to create in planned trials grid of protocol
- Creates each trial using listed trial ID, opens in separate ARM sessions

The screenshot shows a software window titled 'Protocol Description'. It has several tabs: 'Trial Establishment Guidelines', 'Crop/Pest Description', 'Soil', 'Application', and 'Crop St...'. The 'Trial Establishment Guidelines' tab is active, displaying a table with the following data:

Trial ID	Responsible	Number of Trials	Sit
G-All7_Ins1-3	SPAIN <input type="checkbox"/>	3	
G-All7_Ins4-5	ITALY <input type="checkbox"/>	2	<input checked="" type="checkbox"/>

Below the table, there are input fields for 'Total Trials: 5' and 'Trial Cost:'. There are also dropdown menus for 'Conduct Under GLP: N' and 'Conduct Under GEP: N', and a checkbox for 'Officially Recognized'. At the bottom, there is another table with the following data:

No.	Guideline	
1.	PP 1/135(3) <input type="checkbox"/>	Phytotoxicity assessment
2.	PP 1/152(3) <input type="checkbox"/>	Design and analysis of effi

At the bottom of the window, there is a section for 'Objectives:'. A context menu is open over the table, with the 'Create this Trial' option highlighted. The menu items include: 'Insert Repeating Section...', 'Delete Repeating Section...', 'Save Repeating Section It...', 'Load Repeating Section Se...', 'Hide Current Field', 'Display All Fields', 'Display Hidden Fields with', 'Set As Default', 'Protocol Description View', 'Tile Protocol Description a', 'Show Validation List...', 'Accept All Changes', 'Create this Trial', and 'Show Tooltip'.

Summary Across Trials 2015

- ST Report option to print Mean Level CV
- Identify on ST Report the error term used for mean comparison tests when either Trial or Treatment is random, as defined on ST Summary Options dialog

AOV

Table: Full

Method: Advanced ST 8

Fixed effect: Trial
 Treatment
 Both



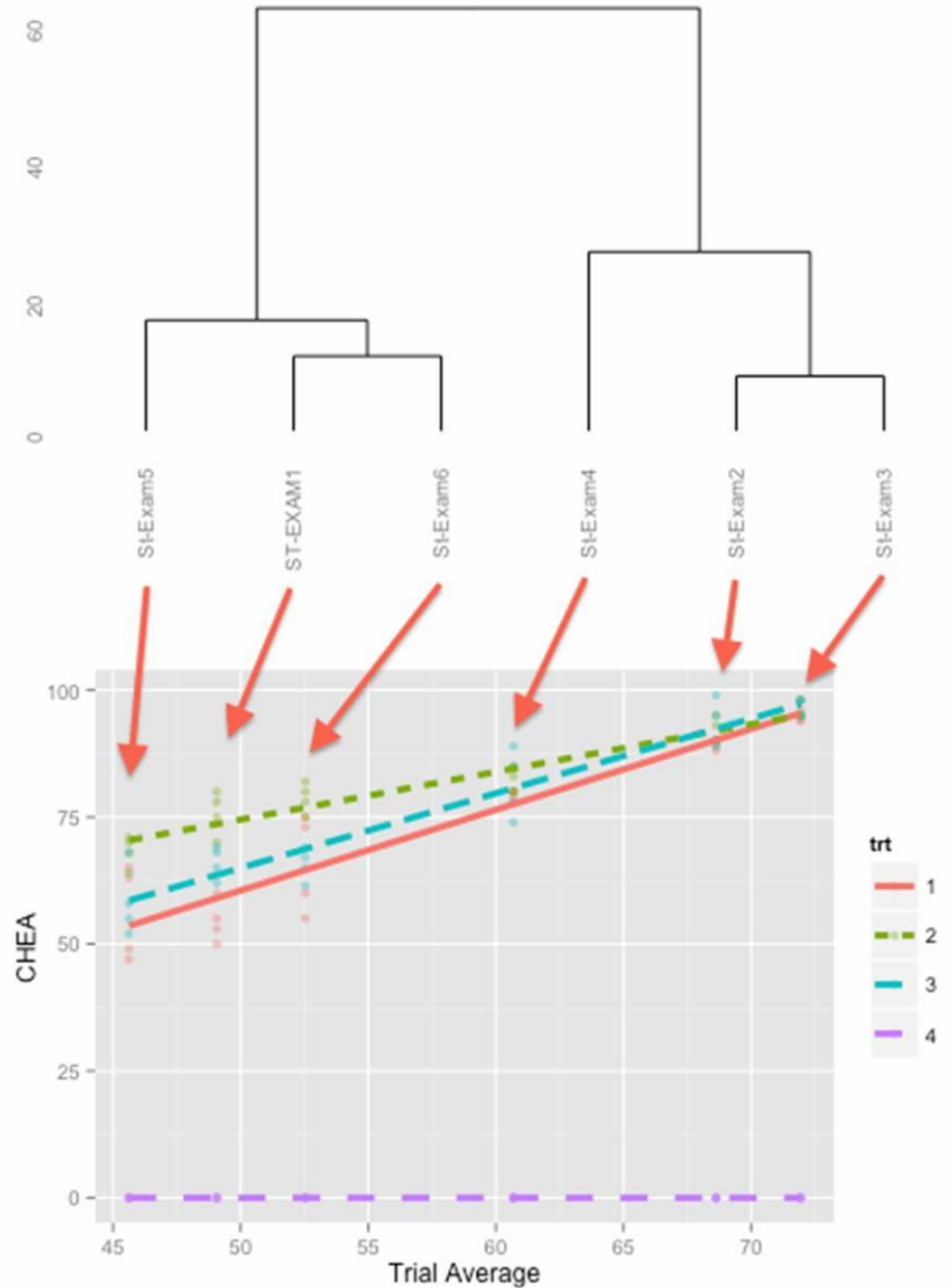
Summary Across Trials 2015

- Graph helps identify “location” (trial) groups when a significant location effect (treatment x trial interaction) is detected

ST 2015

- Dendrogram

- Treatment *
- Trial graph





Summary

New ARM 2015 tools can help improve trial quality and efficiency:

- Plan appropriate number of replicates
- Improve quality of randomizations
- Analyze results to improve planning of follow-up experiments



Summary

- ARM 2015 release 4th quarter 2014
- Upgrade from ARM 9/8 for reduced cost
- See www.gdmdata.com for the newest information on ARM 2015