Trial Reporting
Capabilities of ARM 9

See www.gdmdata.com/resources/meetings.htm for presentation copy
(Meeting Calendar link on left navigation panel of www.gdmdata.com)

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Graphs

- Display untreated/check and reference treatments with special colors
- Hover mouse over outlier 'X' on box-whisker graph to show plot number(s) (especially useful with subsamples)
Graphs

- Auto-size graph title boxes in new graph to optimize using graph space
- Resize y-axis to show all outliers of box-whisker graph (previously you had to manually size)
Graph Tips

- Treatment Description on Trial Map is used for treatment labels on graph.
- Use Horizontal bar graph to better display long treatment names.
- Use Next Data/Previous Data buttons on Graph window to display the same graph for other data columns.
Graph Tips

Use “Error Bars” tab on Graph Options to display standard deviation or standard error bars.

**Note:** ARM graph error bars use appropriate AOV error term for design. On many graph programs (such as Excel) error bars are only correct for Completely Random design.
Graph Tips

- “Show data labels” on Labels tab of Graph Options shows treatment means.
- Use “Display AOV mean comparison letters” on Labels tab of Graph Options to show AOV mean comparison letters.
- Treatment selection order (e.g. 5 4 3 2 1) defines treatment order on a graph.
Graph Tips

- Clipboard button is the easiest way to copy graphs to another program.

- Paste in destination program to include the graph.
Print Reports:
Remove page break when...

- 'Remove page break when blank space exceeds (%)' option reduces unused space on report pages
Print Reports:
Remove page break when...

- Can shrink 4 pages to 1

<table>
<thead>
<tr>
<th>Trt No.</th>
<th>Treatment Name</th>
<th>Form</th>
<th>Form Unit</th>
<th>Conc Unit</th>
<th>Rate</th>
<th>Type</th>
<th>Unit</th>
<th>Mix Size</th>
<th>Mix Size Unit</th>
<th>Amt Product to Measure</th>
<th>Reps: 4</th>
<th>Appl Code: A</th>
<th>Plots: 2.5 by 10 meters</th>
<th>Spray vol: 200 L/ha</th>
<th>Mix size: 2.15 liters (min 2.15)</th>
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<tbody>
<tr>
<td>3</td>
<td>TUB</td>
<td>250 G/L</td>
<td>EC</td>
<td>1</td>
<td>1 ha</td>
<td>ABC</td>
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<td>ABC</td>
<td>1</td>
<td>1 ha</td>
<td>ABC</td>
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</table>

Sort Order: Application Code, Replicate 1
New Site Description reports simplify changing between common report uses.
New Site Description Reports

- Allow printing several report segments
New Site Description Reports

- Allows you to create your own custom reports
Print Selected Replicates

- General Summary report option to exclude replicates that may be damaged
Print Selected Replicates

- Similar prompting as selected data columns or header rows
AOV Means Table Report OSLs

- New significance levels for LSD, SNK, and Tukey's mean comparisons of 15, 20, 25, 30, 40, 50%
AOV Means Table Report OSLs

- Allows selecting appropriate significance levels according to ‘penalty of failure’ for tested treatments.

Example: new ‘plant health’ products frequently improve yield, yet a failure loses only cost of product, so reduced significance levels are more appropriate than for crop protection products.
Heterogeneity/Skewness/Kurtosis on Summary Reports

- ARM 9 always tests homogeneity of variance and normality for summaries.
- Possible solutions are listed on Summary Report Messages:
  - Apply data correction transformation
  - Exclude check treatment
  - Exclude treatment with highest or lowest standard deviation (if either works)
  - Exclude replicate
Assumptions of AOV

- Normality: distribution of observations from which samples were collected is a normal "bell" curve.
- Homogeneity of variances: different treatments do not change variability of observations.
- Additively: observations of treatment effects are additive (linear), not multiplicative.
Skewness

- Skewness measures asymmetry of the data distribution: the peak on a data distribution graph is shifted either right or left.
Kurtosis

Kurtosis measures “peakedness” of data distribution: the peak is either flatter or sharper than a normal distribution.
Correcting Heterogeneity of Variance

- Data Correction Transform
- Eliminate ‘different’ treatment (often the check)

<table>
<thead>
<tr>
<th>Rating Type</th>
<th>ARM Action Codes</th>
<th>COUINS APC</th>
<th>COUINS EC APC</th>
<th>COUINS TL[1] APC</th>
<th>COUINS TS[1] APC</th>
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</thead>
<tbody>
<tr>
<td>Trt Treatment</td>
<td>No. Name</td>
<td>Rate</td>
<td>Rate Unit</td>
<td>1</td>
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<tr>
<td>1 Untreated Check</td>
<td></td>
<td></td>
<td></td>
<td>106.3 a</td>
<td>106.3 a</td>
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<tr>
<td>2 Sure Kill NIS</td>
<td></td>
<td>250 g ai/ha</td>
<td>0.5 % v/v</td>
<td>13.5 bc</td>
<td>13.5 b</td>
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<tr>
<td>3 Super Stomp NIS</td>
<td></td>
<td>250 g ai/ha</td>
<td>0.5 % v/v</td>
<td>17.0 bc</td>
<td>17.0 b</td>
</tr>
<tr>
<td>4 Sure Kill NIS</td>
<td></td>
<td>375 g ai/ha</td>
<td>0.5 % v/v</td>
<td>9.5 c</td>
<td>9.5 b</td>
</tr>
<tr>
<td>5 Super Stomp NIS</td>
<td></td>
<td>375 g ai/ha</td>
<td>0.5 % v/v</td>
<td>24.0 a</td>
<td>24.0 a</td>
</tr>
</tbody>
</table>

| | | | | | |
| LSD (P=.05) |  | 8.93 | 6.15 | 0.14t | 0.62t |
| Standard Deviation |  | 5.80 | 3.84 | 0.09t | 0.40t |
| CV |  | 17.03 | 24.03 | 6.52 | 7.73 |
| Bartlett’s X2 |  | 12.244 | 6.488 | 7.706 | 5.596 |
| P(Bartlett’s X2) |  | 0.016* | 0.09 | 0.103 | 0.231 |
| Skewness |  | 1.6078* | 0.677 | 0.8784 | 1.34* |
| Kurtosis |  | 1.0506 | -0.0687 | -0.2758 | 0.399 |
Heterogeneity/Skewness/Kurtosis on Summary Reports

- Apply automatic transformations or treatment exclusions to data columns that violate assumptions of AOV:
  - Prompt
  - Yes
  - No
Heterogeneity/Skewness/Kurtosis on Summary Reports

- When ‘Prompt’ a confirmation dialog identifies violation(s) and asks:

![ARM - SPECIAL CONFIRMATION dialog box](image_url)
Heterogeneity/Skewness/Kurtosis on Summary Reports

- When ‘Yes’ or ‘Prompt’ the applied actions are listed in Report Messages

![Report Messages](image)
Heterogeneity/Skewness/Kurtosis on Summary Reports

- Corrections added to ARM Action Codes
  - AL = Automatic Log
  - AA = Automatic Arcsine Square Root Percent (only tested for 0-100 data)
  - AS = Automatic Square Root

![Table]

<table>
<thead>
<tr>
<th>15 DA-B</th>
<th>15 DA-B</th>
<th>29 DA-B</th>
<th>29 DA-B</th>
<th>11 DA-C</th>
</tr>
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<tbody>
<tr>
<td>AL</td>
<td>AL</td>
<td>AA</td>
<td>AA</td>
<td>AL</td>
</tr>
<tr>
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<tr>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
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<tr>
<td>7.82 a</td>
<td>0.00 b</td>
<td>15.28 a</td>
<td>0.00 c</td>
<td>2.31 b</td>
</tr>
</tbody>
</table>
Heterogeneity/Skewness/Kurtosis on Summary Reports

- Exclude check treatment
  - EC=Exclude Check

![Confirmation dialog box](image.png)

Exclude treatment 1 from data column 1 to correct heterogeneity of variance/skewness/kurtosis?

Yes  No

- 1 962.8
- 30.8 a
- 30.8 a
- 36.3 a
- 34.5 a
Heterogeneity/Skewness/Kurtosis on Summary Reports

- ARM cannot automatically exclude a non-check treatment number, since there is no special ARM Action Code defined for this task.
- GDM plans to define a ‘ETn’ code, such as ET8 to exclude treatment number 8, so non-check treatments can also be automatically excluded.
Report Sets

- Report set = selected reports plus all options for those reports
Report Sets

- Report sets save your preferred options to easily use again later.
- Can standardize reports in your group.
- Save report Set to keep your options.
- Load Set to use these options later.
- Recommend creating sets for each part of research season (map, spray/seeding plan, labels, tour report, summary, etc.)
Steps to Save Report Set

- Select report components to include.
- Set desired options for each report in set, such as whether to print only completed fields (hide blank fields).
- Arrange reports in desired order in set (highlight a report, press and hold Shift, press up/down arrow to move report).
- Select Save Set button.
Use Views with Reports

- All Summary reports include options to use “Current View”
  - Select for data columns and/or data header rows as desired.
  - Use “View” button in Summary Report options to display current Assessment Data View dialog settings.
Apply Sort to Data Columns

- Sort data columns by applying sorts on View Options. For example, to sort by Pest then Date within Pest:
  - Click Clear button below Sort column.
  - Enter 1 in Sort column of Pest Code.
  - Enter 2 in Sort column of Rating Date.
  - Select “Display sort as tabs” to have each Pest Code on separate tab in editor.
Apply Sort to Data Columns

- Results in sorted tabs:

![Image of spreadsheet showing sorted data]
Apply Sort to Data Columns

- ARM supports defining any number of sort fields (continue entering sort priority number).

- To define an arbitrary sort order:
  - Enter terms to sort by in “Sort Order for View” header field.
  - Define “Sort Order for View” as sort field 1.
Assessment Data View Options

- Display only data columns that contain a desired field entry by defining Match in View Options.
  - Click into Match column, select term to match from dropdown.
Assessment Data View Options

- Use “Data origin” to show only Original or Calculated columns.

- Use “Entry status” to show only columns with Data.
“Current View” on Summaries

- All Summary reports have “Current View” for data columns, header rows.
- “View” button changes current view.