

# GTA SUITE SOFTWARE



## USER'S GUIDE

**AGCO®**  
**GTA300 Mapping**





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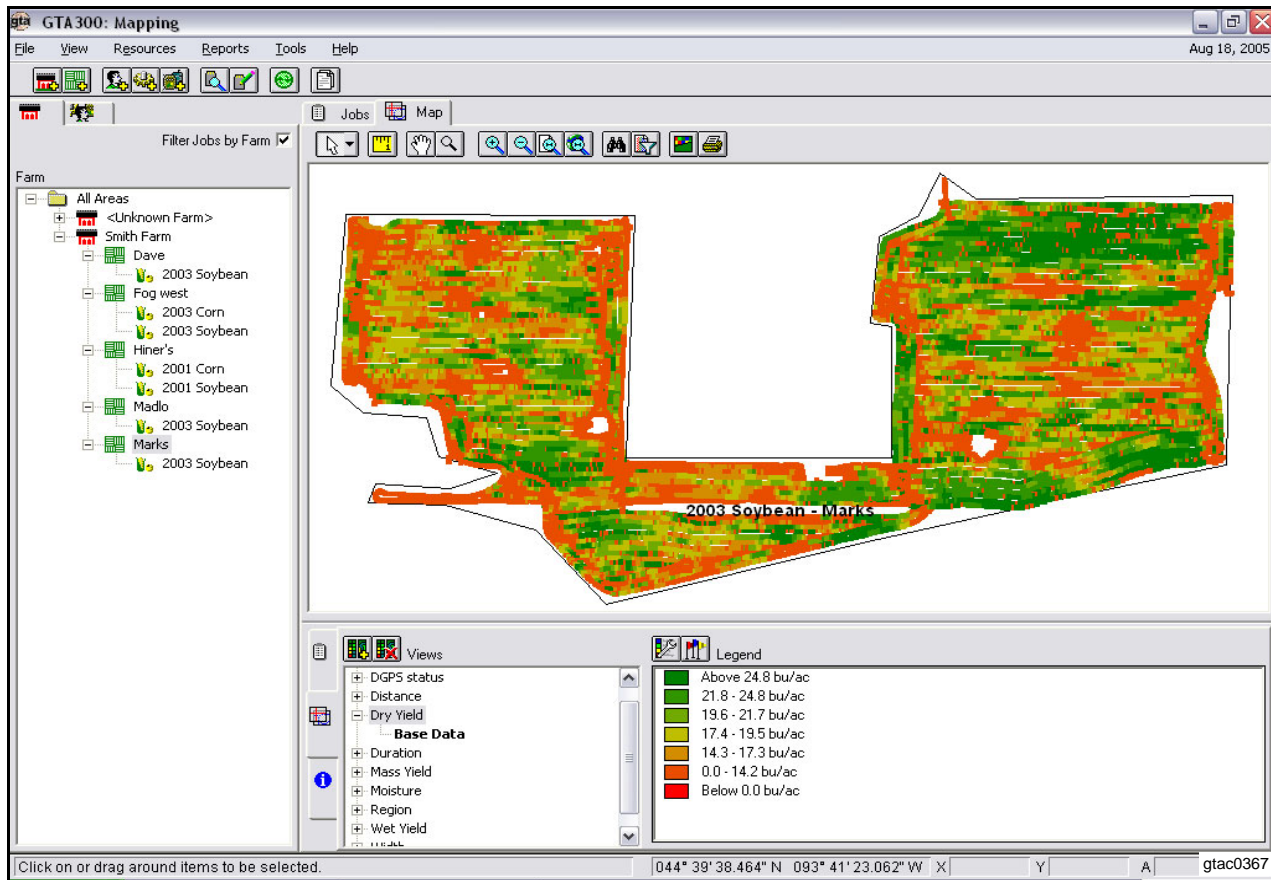
**AGCO®**  
**79023816 B Rev.**  
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# GENERAL INFORMATION

**FIG. 1:** GTA300 Mapping software allows users to view **logged (GPS) job data**. Sources of logged job data include: GTA Consoles I and II, Fieldstar Terminal, or other common monitor types. Mapping data makes it easy to view yield variations throughout a field. Application plan maps, using the .FSA (Fieldstar Application), SGIS FODD.xml and .yld/.ilf (AgLeader) formats, may also be viewed.



**FIG. 1**

New capabilities include:

- View and print **maps** of field data.
  - Create custom legends for reports
  - Overlay marker data on yield maps
- **Import data** in third party formats, such as:
  - AGLeader App/Site Ver. (\*.yld, \*.ilf)
  - AgLeader/Case AFS Harvest (\*.yld, \*pfl, \*.ilf)
  - GreenStar Binary (\*.gsy, \*gsd)
  - Voyager/Case New Holland (\*.CNH)

- **Create Map Reports:**
  - Yield data
  - Product Application
  - Wheel Slippage
  - Fuel Consumption
- **Field Boundary Editing**
  - Import/Export as a shape file
  - Hand drawn boundaries

*NOTE: GTA300 only displays a map of geo-referenced data. Fieldstar, GTA Console I or II must be equipped with a GPS receiver in order to log geo-referenced data.*

## GENERAL INFORMATION

### ACQUIRING DATA

#### GTA Console II

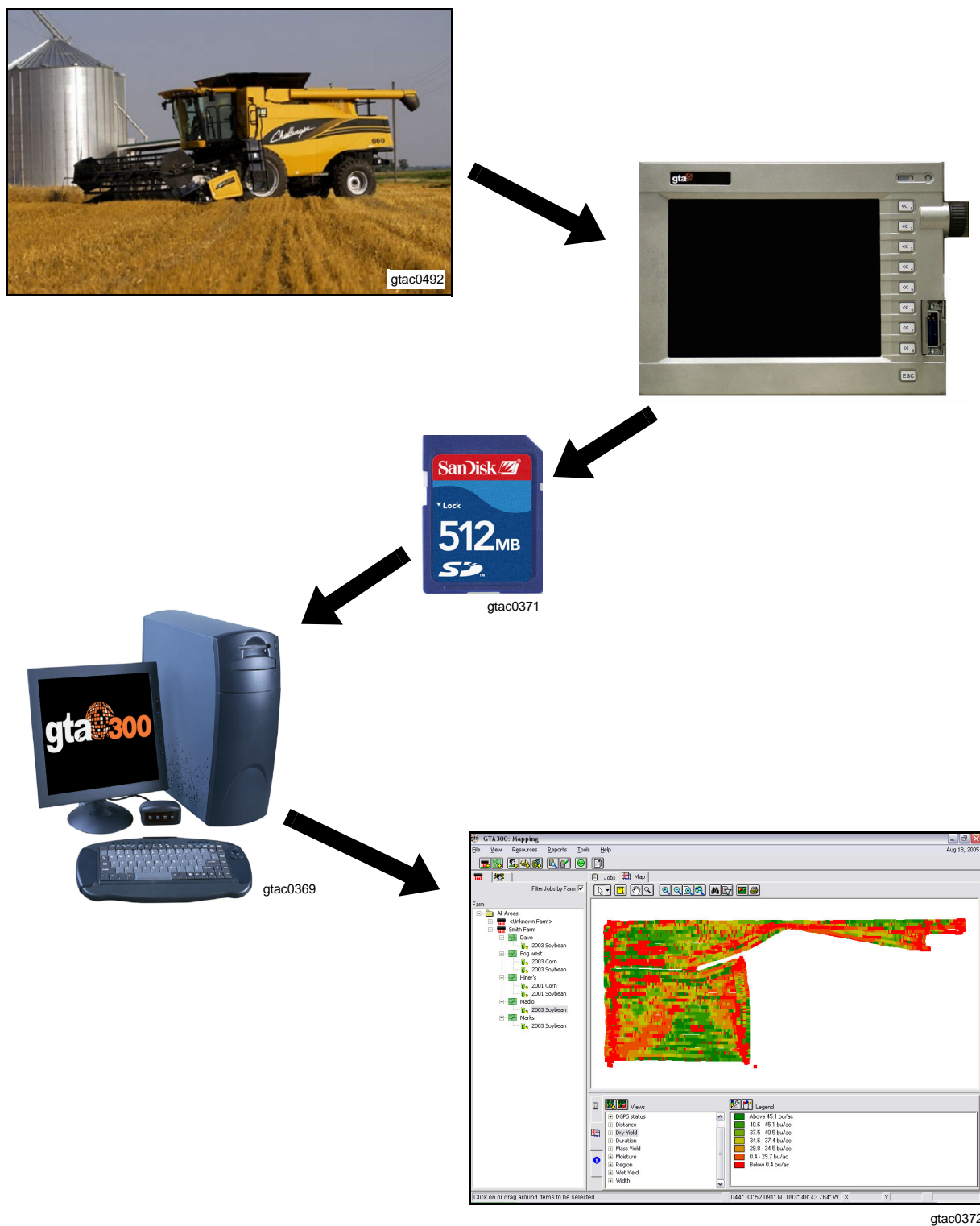


FIG. 2

**FIG. 2:** GTA Console II writes data to a SD card, for use with GTA300 Mapping.

## Fieldstar Terminal

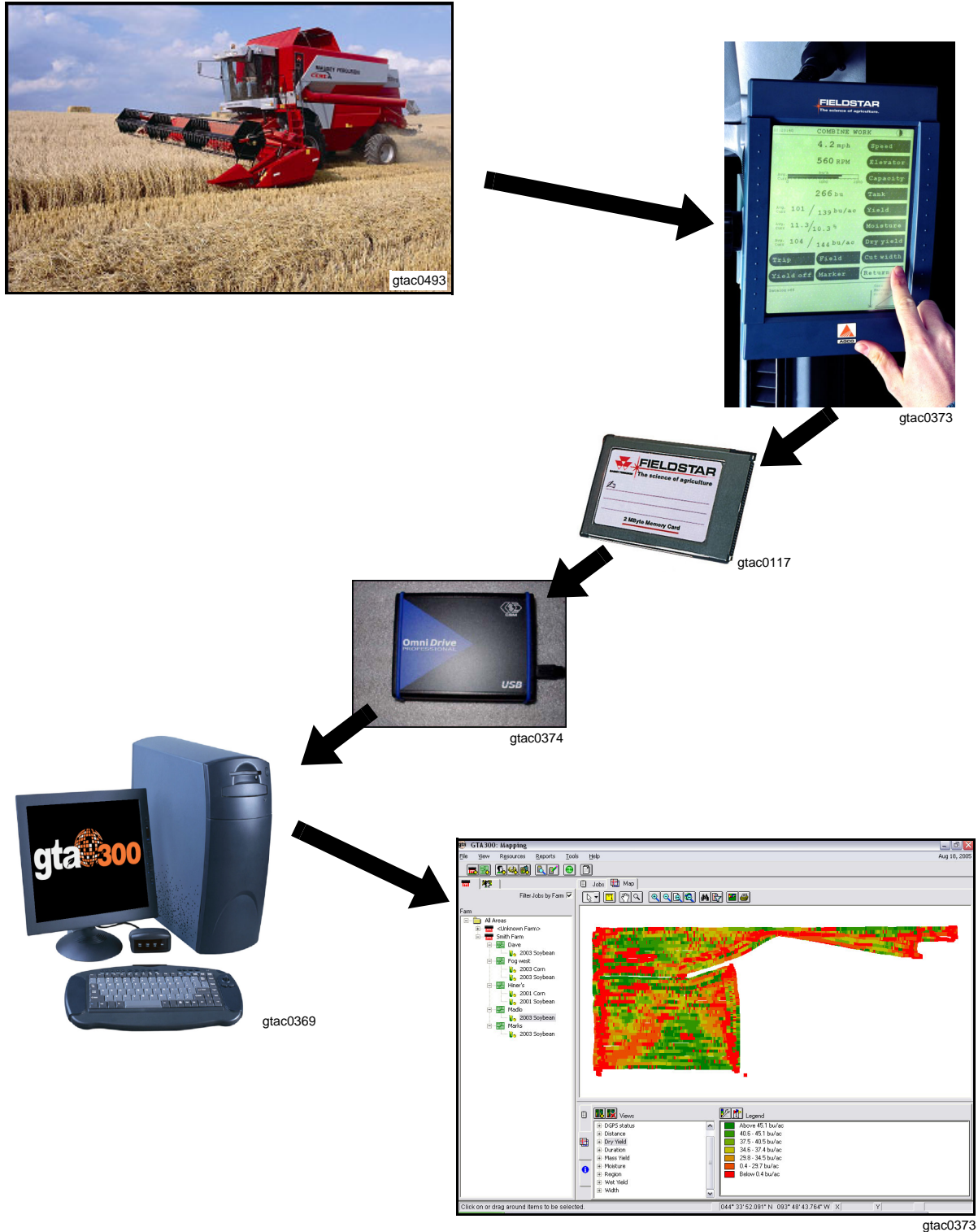


FIG. 3

FIG. 3: Fieldstar terminal writes data to a linear PCMCIA card, for use with GTA300 Mapping.

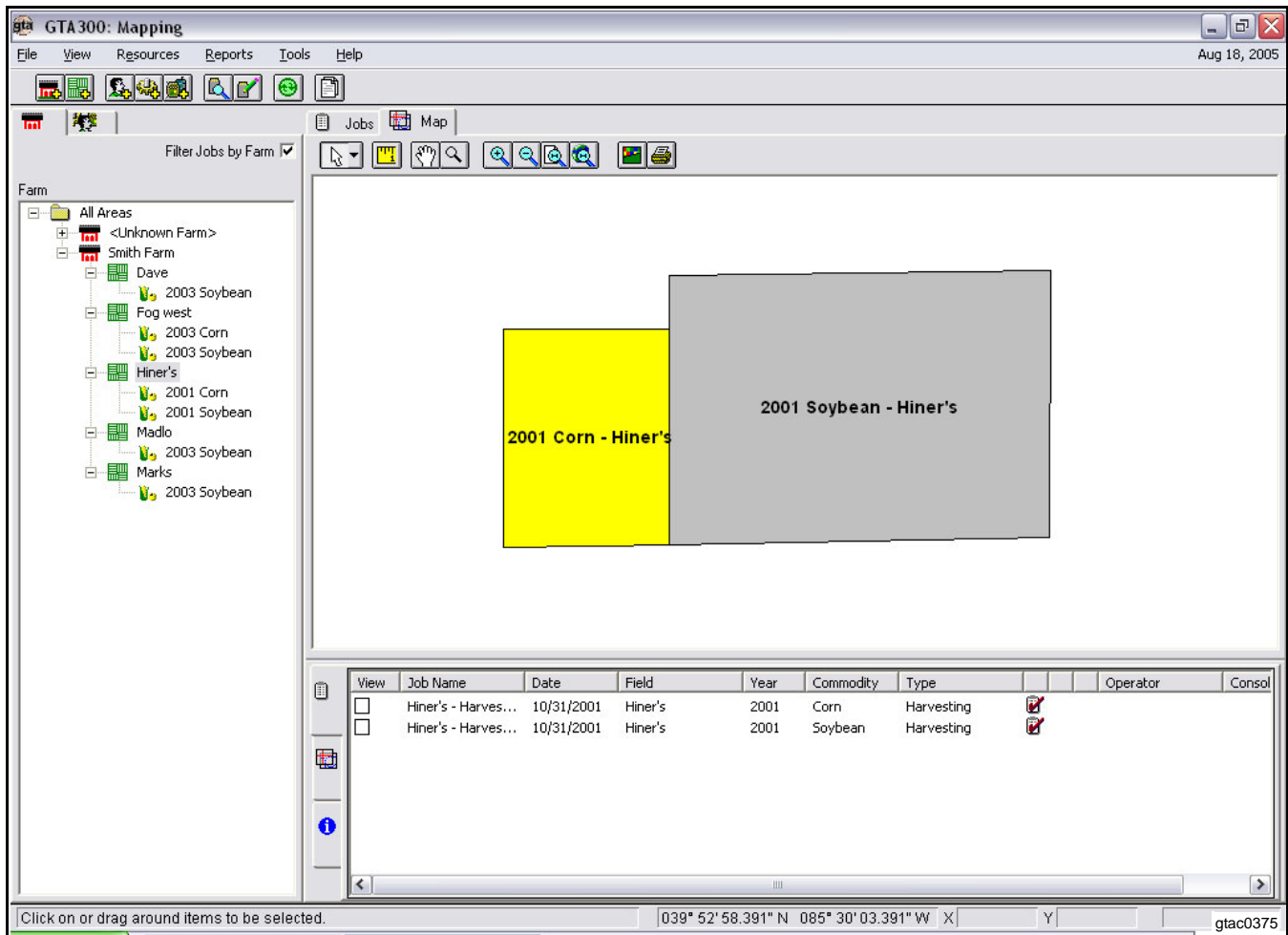




# APPLICATION

## RESOURCE MANAGER

### Farm Tab



**FIG. 4**

**FIG. 4:** The **Farm** tab continues to list multiple Farms and Fields in its tree structure. Fields may now be subdivided into one or more **Crop Enterprises** (year, crop type). This allows the user to keep records of each crop year. Jobs can be sorted by Crop Enterprise within a Farm or Field. Crop Enterprise Boundaries are discussed in more detail in Boundary Editing on page 18.

# Application

## DATA VIEWER

### Jobs Tab

View	Job Name	Date	Field	Year	Commodity	Type	Operator	Console #
<input type="checkbox"/>	Fog west	09/28/2003	Fog west	2003	Soybean	Harvesting	McBain, Dave	
<input type="checkbox"/>	DAP Application	10/31/2002	Fog west	2003	Soybean	Application	McBain, Dave	
<input type="checkbox"/>	Fog west - Appli...	06/16/2003	Fog west	2003	Soybean	Application	McBain, Dave	
<input type="checkbox"/>	Fog west - Planti...	04/19/2003	Fog west	2003	Soybean	Planting/Seeding	McBain, Dave	
<input type="checkbox"/>	Fog west - Land ...	04/10/2003	Fog west	2003	Soybean	Land preparation	McBain, Dave	
<input type="checkbox"/>	Fog west - Appli...	03/20/2003	Fog west	2003	Soybean	Application	McBain, Dave	
<input type="checkbox"/>	Fog west	09/28/2003	Fog west	2003	Soybean	Harvesting	McBain, Dave	

FIG. 5

**FIG. 5:** The **Jobs** tab continues to list Planned and Completed jobs. Two additions have been made to the Jobs tab; the **Merge** button and the **View** column. The Merge function allows multiple jobs of the same crop, year and field to be combined into one job.

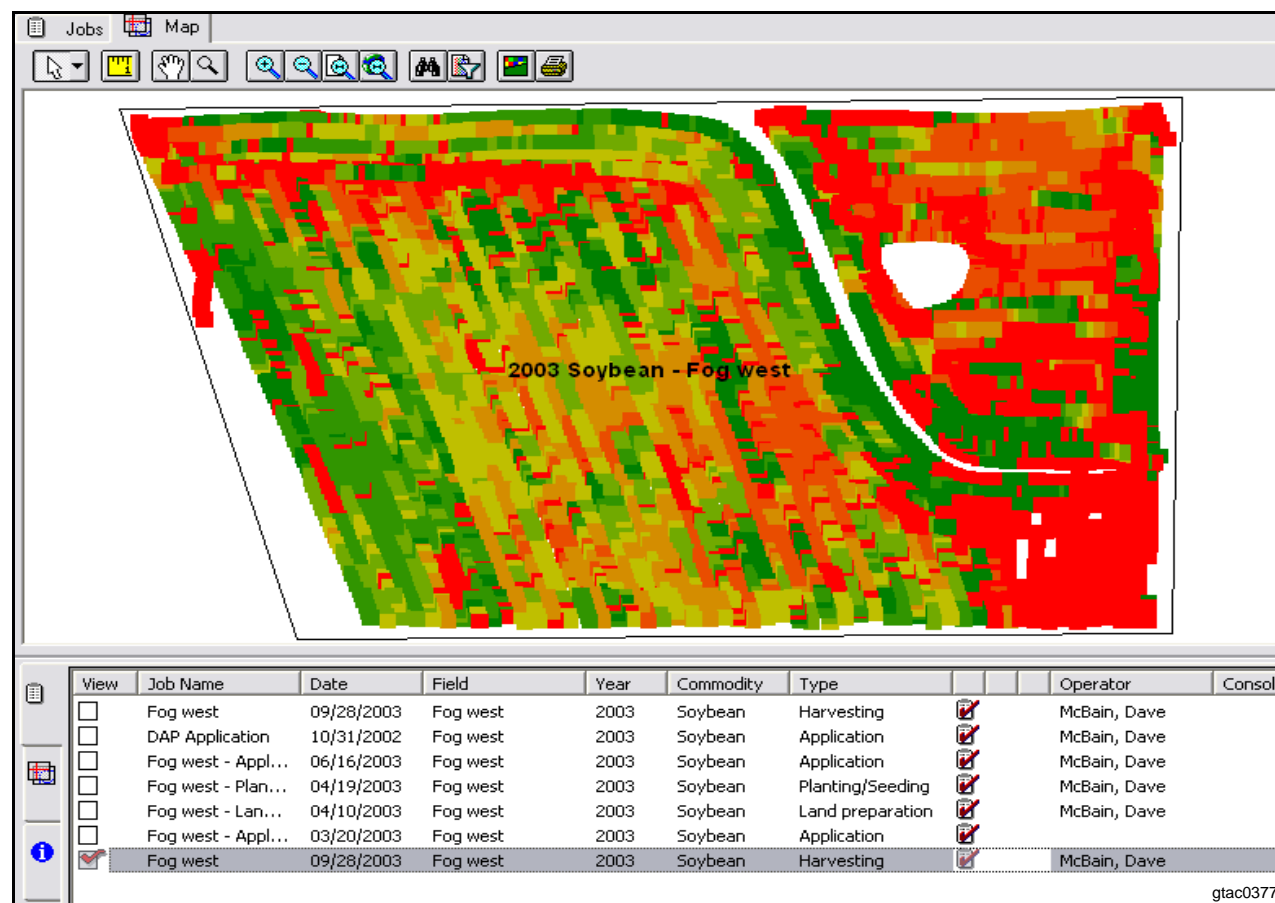


FIG. 6

**FIG. 6:** When a check mark is placed in the View column of a completed job, the completed job map is displayed on the Map tab.

## Map Tab

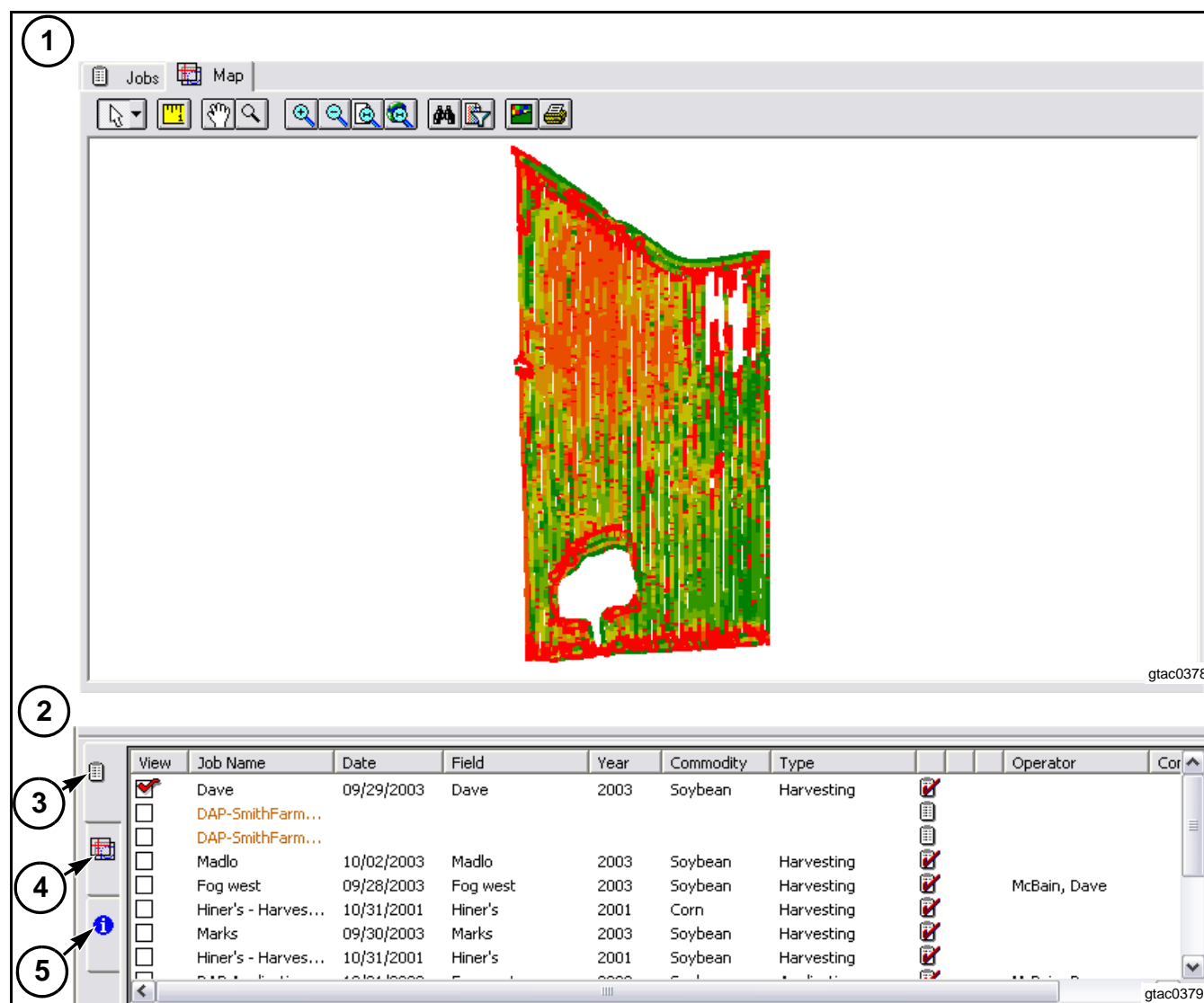


FIG. 7

**FIG. 7:** The **Map** tab allows you to view and edit spatial data imported from the field. The Map tab is conveniently divided into two panes. The upper pane (1) is used to display spatial information, whereas the lower (2) is used to view details about data values. Within the lower pane, are three vertical tabs: **Job Selection** (3), **Map Properties** (4), and **Information** (5).

# Application

## Map Tab Toolbar

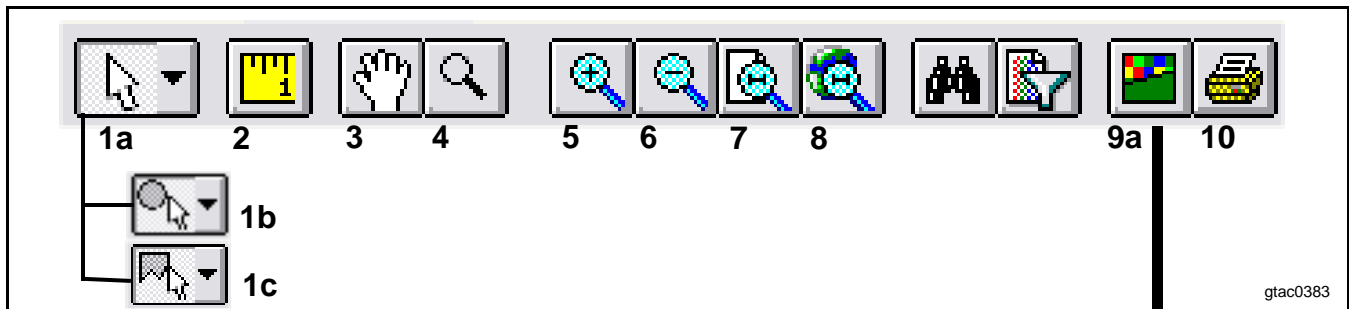


FIG. 8

FIG. 8:

- (1) Selection Tools:  
Select areas in a mapped job  
(1a) Rectangular, default  
(1b) Circular  
(1c) Polygonal
- (2) Measure Tool:  
Makes linear measurements
- (3) Pan Tool:  
Move or drag visible map area  
Shortcut: use arrow keys on keyboard to scroll
- (4) Zoom Tool:  
Zoom in or out on a mapped job
- (5) Zoom in Tool:  
Zoom in on a map  
Shortcut: use 'I' on keyboard
- (6) Zoom out Tool:  
Zoom out on a map  
Shortcut: use 'O' on keyboard
- (7) Zoom to Layer Tool: Zoom to extent of selected job  
Shortcut: use 'A' on keyboard
- (8) Zoom to Full Extent Tool:  
Zoom to full extent of highlighted level
- (9a) Display Options Tool:  
(9b) Boundary Layer  
Boundaries - Field/Enterprise Color  
Border - Color and width  
(9c) Show Text Labels - Font size and color  
Harvesting  
Only available when job is selected  
Point size and color
- (10) Print Tool:  
Print or preview a document

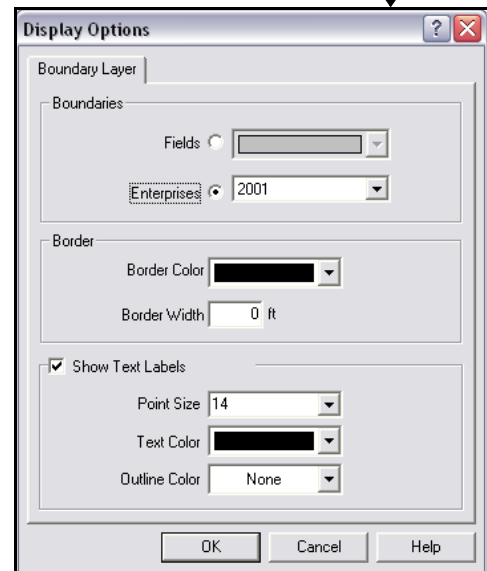


FIG. 9

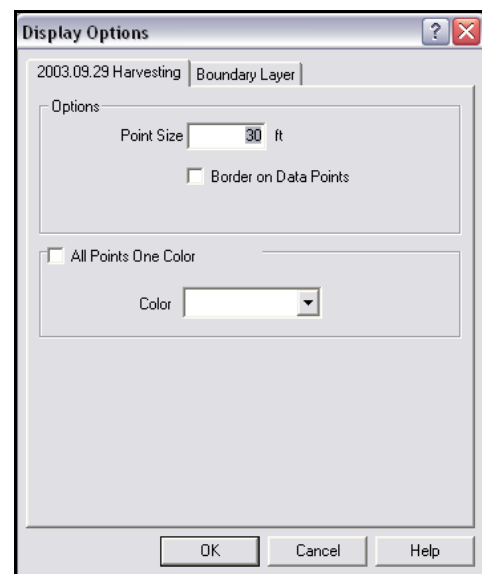


FIG. 10

## SHOW ME AND FILTER TOOLS

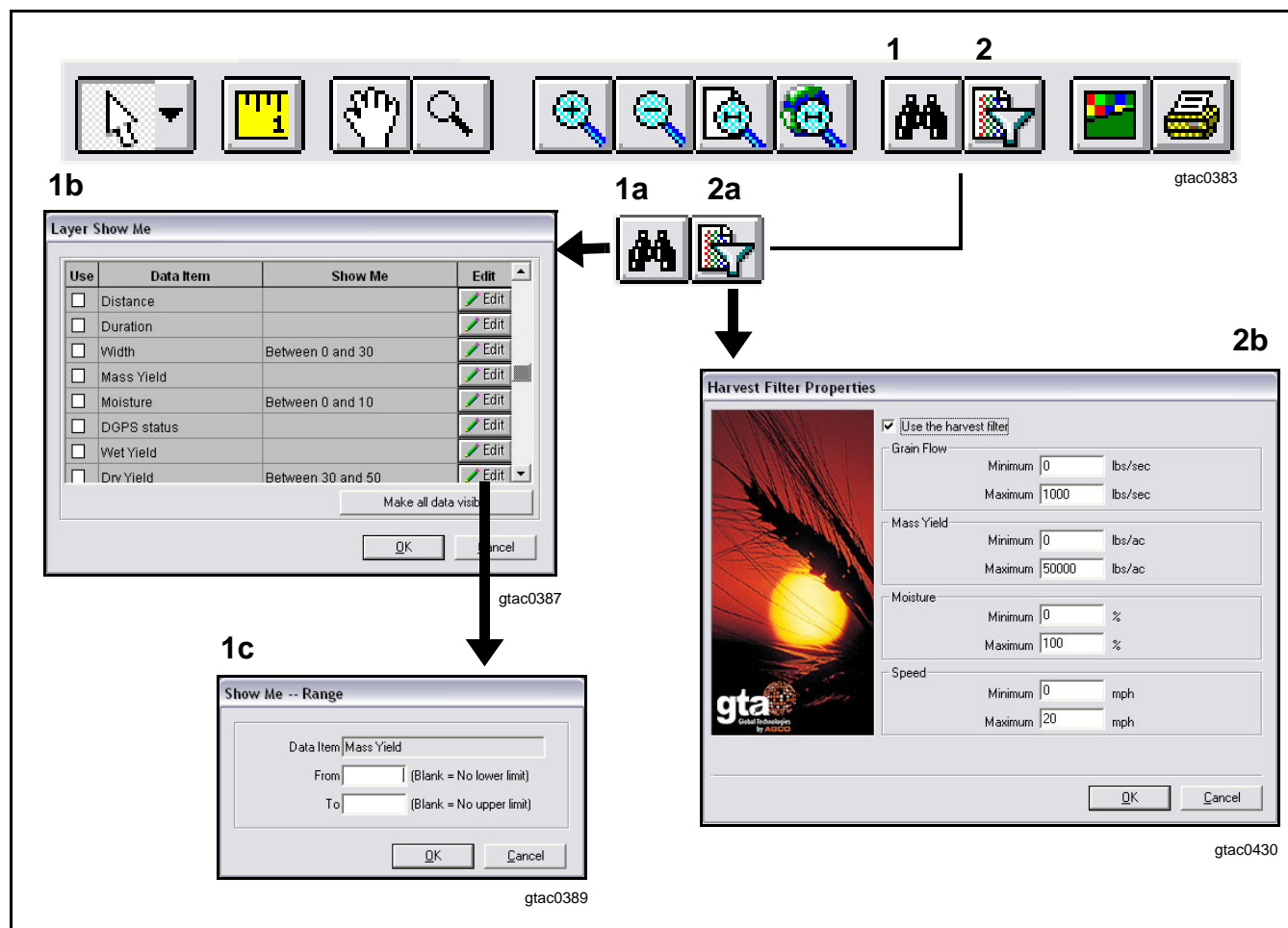


FIG. 11

## 1. Show Me Tool:

Show Me is a visual aid. Clicking on the Show Me button will bring up the Layer Show Me window where you can choose which points to look at. Only points that meet the specified criteria will be shown. One or more data items can be chosen to be shown in one map view.

Points may be selected when chosen data points are visible, to view the averages. This tool can assist in quickly identifying areas within the field.

## 2. Filter Tool:

Filter allows you to further filter your harvest or yield data. Grain Flow, Mass Yield, Moisture and Speed can all be filtered by stating a minimum and maximum range, to be displayed, for each. Points that are not displayed are temporarily deleted. Changing the minimum and maximums back to the original numbers will display all original points.

Data that is filtered is not used in calculating minimum, maximum and averages. Therefore the total quantity harvest will not be changed when a filter is applied.

This filter option is available when initially importing data. When items are filtered, either before or after importing data, they are hidden within the program. Changing the filtering options will allow previously filtered data to be viewed.

# Application

## Job Selection Tab

The **Job Selection tab** appears in the lower pane of the Map tab. This feature allows you to select jobs without leaving the Map tab. Only filtered jobs will be listed, when filtering by field. Data points are turned on or off in the Maps tab, by checking or unchecking boxes in the View column.

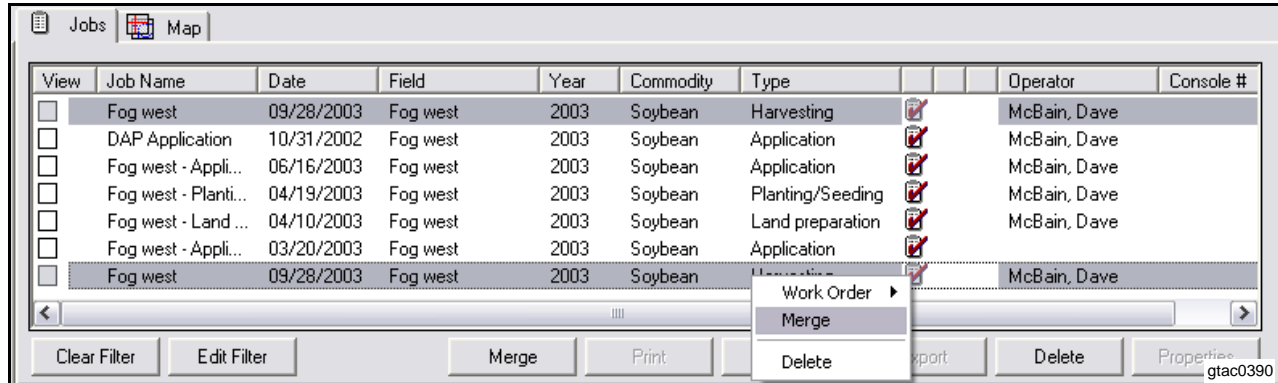


FIG. 12

## FIG. 12: MERGING JOBS

Two or more jobs can be merged, if they consist of the same crop, year and field. Multiple jobs can be merged by right clicking on the selected jobs, and selecting merge.

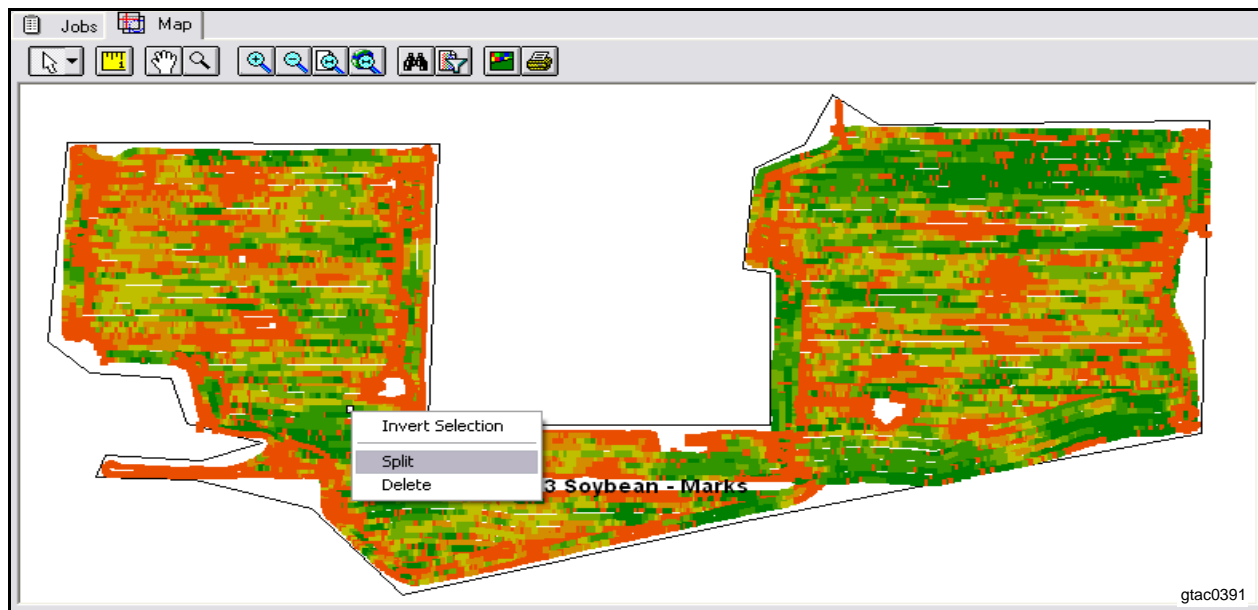


FIG. 13

## FIG. 13: SPLITTING JOBS

You may want to use the Split Job feature if multiple fields were harvested as a single job. To create a Split, select (with a selection tool) the part of the job that needs to be separated; right click and select Split. Jobs previously merged may be divided again using the Split option.

## Map Properties Tab

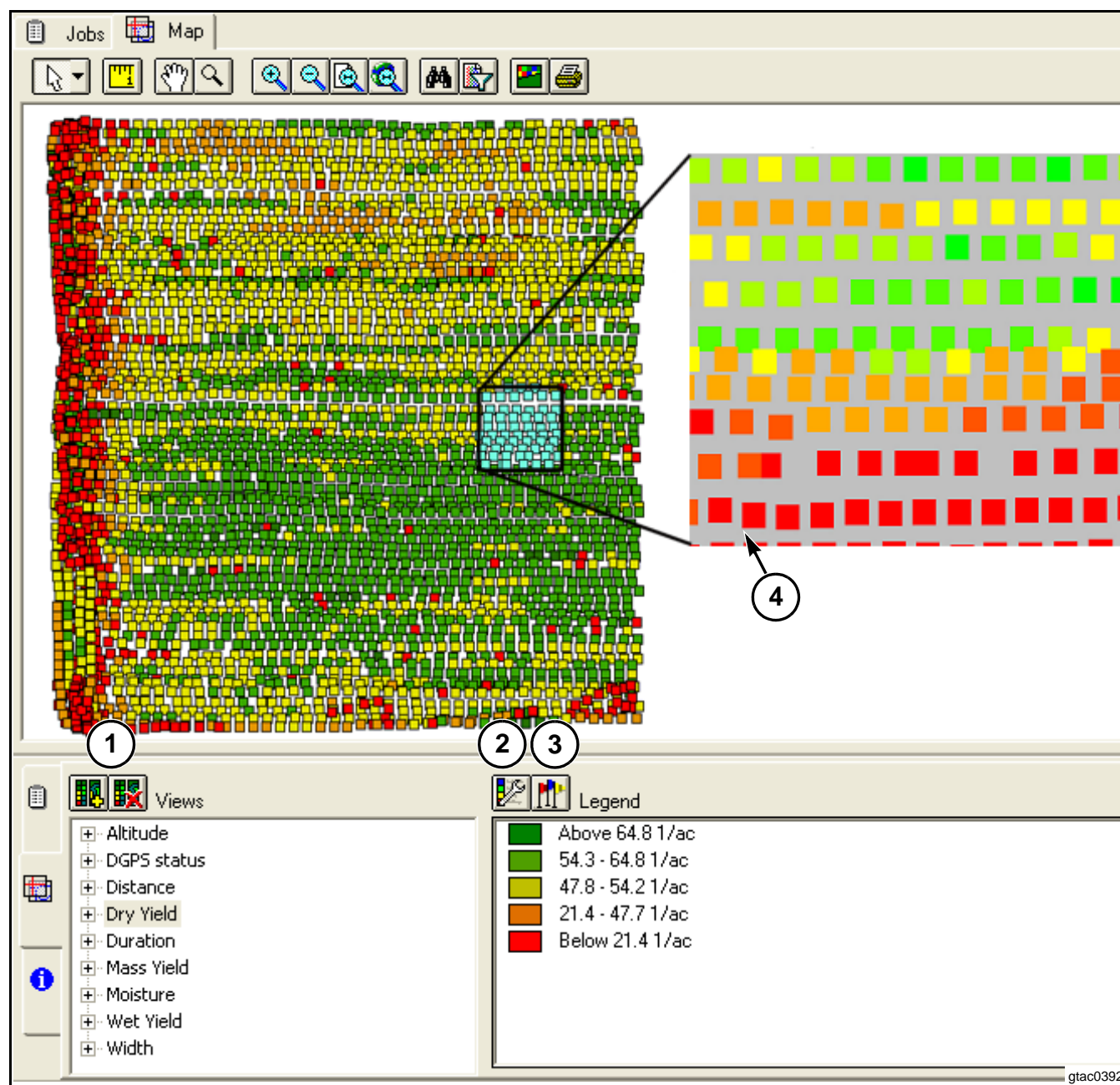


FIG. 14

**FIG. 14:** The **Map Properties tab** has three primary functions. You can create customized views (1), edit the map legend (2) and overlay markers on mapped data (3).

Raw data from imported jobs appear as isolated points (4).

## MAP VIEW (RAW DATA)

Raw data is shown by checking a job, in the view column, and clicking on the map tab. Raw data is displayed as a series of isolated points. An imported job may contain numerous points (datums); each of which represents many categories of data collected in the field. For example, yield monitors collect data for many variables, such as: altitude, dry yield, mass yield and moisture content.

*NOTE: A view is limited to the extent of the crop or field boundary. Define these boundaries prior to creating views.*



# Application

## ADDING AND DELETING VIEWS

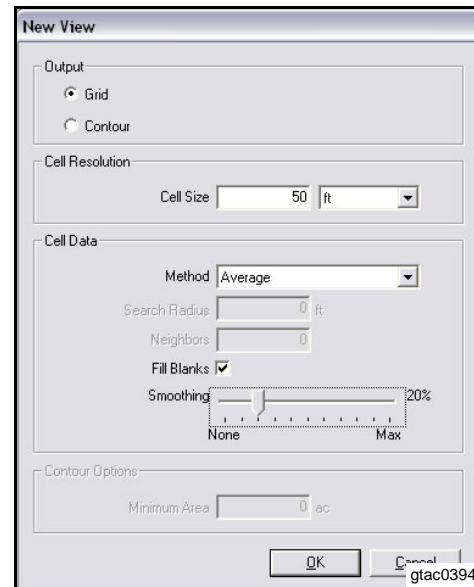


In the lower pane of the Map tab, there are two buttons: Add View and Delete View. A job must be check marked in the Jobs Selection tab. Choose to add or delete views from the list.

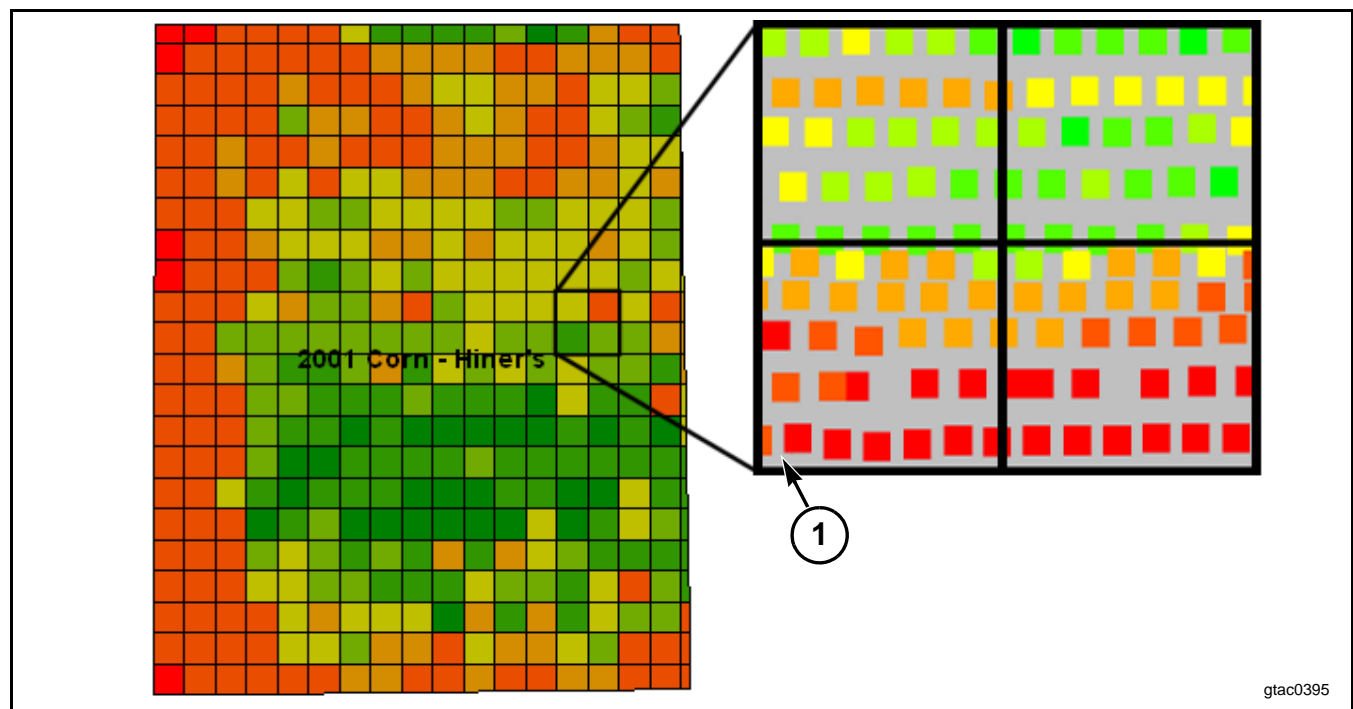
You may choose between two types of map views; Grid and Contour. The details of these two types are discussed in the following pages.

**FIG. 15: Grid View**

1. Output (Appendix A)
  - Grid
2. Cell Resolution
  - Cell Size
    - Determines precision of view
    - Smaller cells offer higher resolution-requires more processing power
3. Cell Data
  - Method
    - Average-assigns a value to each cell by averaging all the values within that cell
    - Inverse Distance-points closest to a cell are more influential than points farther away
  - Fill Blanks (Appendix B)
  - Smoothing (Appendix B)



**FIG. 15**



**FIG. 16**

**FIG. 16:** A **View** is created by overlaying a grid over points and assigning a value to each cell that represents the points that fall within it (1). This creates a continuous map surface with no gaps between data.

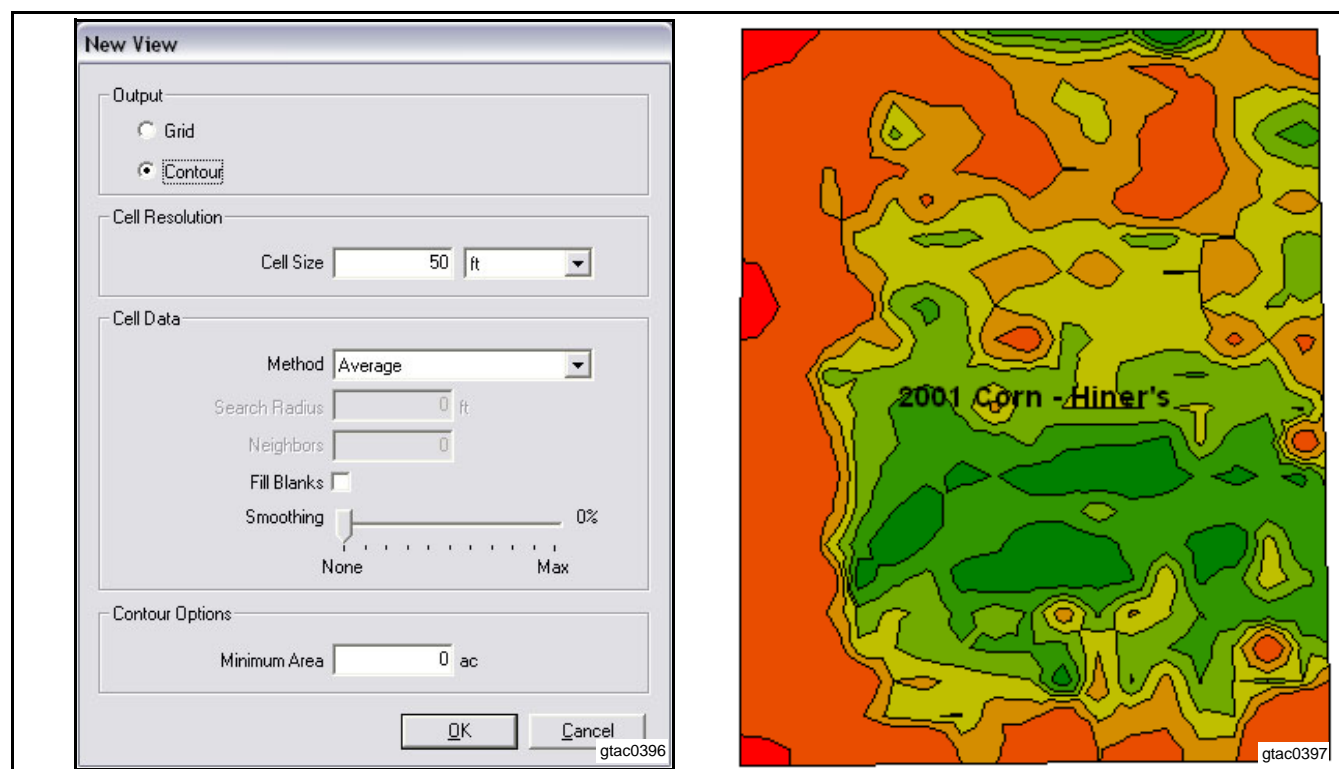


## Contour View

1. Output (Appendix A)
  - Contour
2. Cell Resolution
  - Cell Size
    - Determines precision of view
    - Smaller cells offer higher resolution-requires more processing power
3. Cell Data
  - Method
    - Average-assigns a value to each cell by averaging all the values within that cell
    - Inverse Distance-points closest to a cell are more influential than points farther away
4. Contour Options
  - Search Radius
    - Tells program how far to look for data points, using Inverse Distance
  - Neighbors
    - Tells program how many nearby points to look at
  - Fill Blanks (Appendix B)
  - Smoothing (Appendix B)
5. Contour Report
 

Divides mapped job into several polygons

Minimum mapping area determines size of polygons - e.g. One acre size is chosen, all polygons will be at least one acre in area.



**FIG. 17**

*NOTE: A new view does not have to be created for each attribute, but may be done to appropriately summarize each.*

# Application

## EDIT LEGEND

Legend Properties button

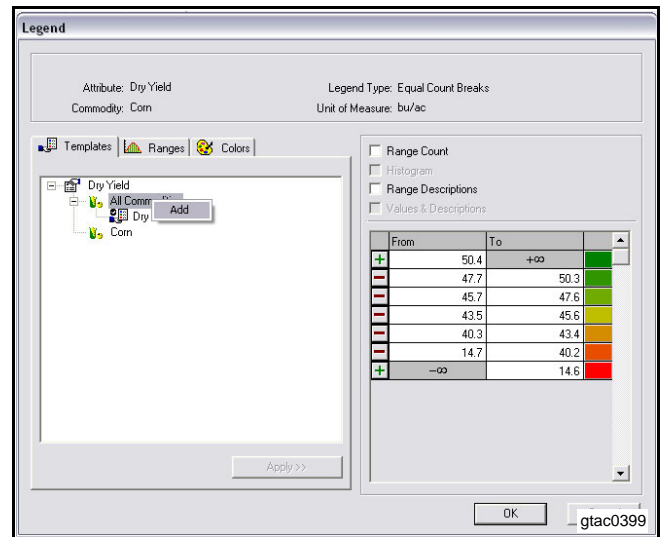


Legend Properties allow you to customize map views by changing ranges and colors. Templates can be created by saving range and color options. After templates are saved, they can be used and applied to other Jobs. Click on the Legend Properties button to open the Legend Properties window. The Legend Properties window contains three tabs: **Templates**, **Range** and **Color**.

### Templates

**FIG. 18:** Add for each attribute by right clicking

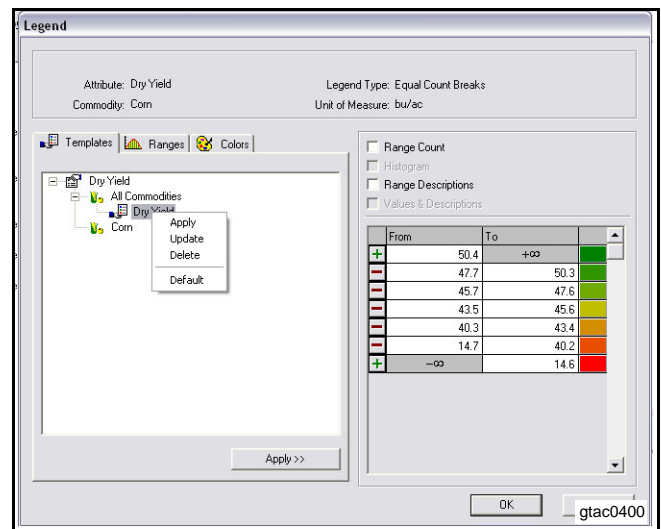
- All commodities
- Single commodities



**FIG. 18**

**FIG. 19:** Right click on a template to:

- Apply the template to the current view
- Update changes to template (save)
- Delete template
- Set template as Default for attribute



**FIG. 19**

## Ranges

**FIG. 20:** Equal Ranges

- Enter three known values
- Fourth is calculated automatically

Templates Ranges Colors

Equal Ranges Equal Count

Statistical Discrete

High Value 46

Low Value 10

Spacing 7

Divisions 7

Apply >> gtac0496

**FIG. 20**

**FIG. 21:** Statistical

- Choose Interval Spacing to see data by 1, 1/2 or 1/4 standard deviations
- Checking the Round values to whole numbers box, rounds range values

Templates Ranges Colors

Equal Ranges Equal Count

Statistical Discrete

Interval Spacing 1/2 Std. Deviation

☐ Round values to whole numbers

Data Items	12996
Unique Data Items	8219
Minimum Value	0.0
Maximum Value	905.5
Mean Average	19.6
Standard Deviation	13.4

Apply >> gtac0495

**FIG. 21**

**FIG. 22:** Equal Count

- Enter the number of range divisions desired
- Calculates most equal data distribution

### Discrete

- Assigns color to each value

*NOTE: not recommended for use with data which has more than 16 unique values*

Templates Ranges Colors

Equal Ranges Equal Count

Statistical Discrete

Number of Divisions 7

Data Items	12996
Unique Data Items	8219
Minimum Value	0.0
Maximum Value	905.5
Mean Average	19.6
Standard Deviation	13.4

Apply >> gtac0494

**FIG. 22**

# Application

## Colors

**FIG. 23:** Four styles

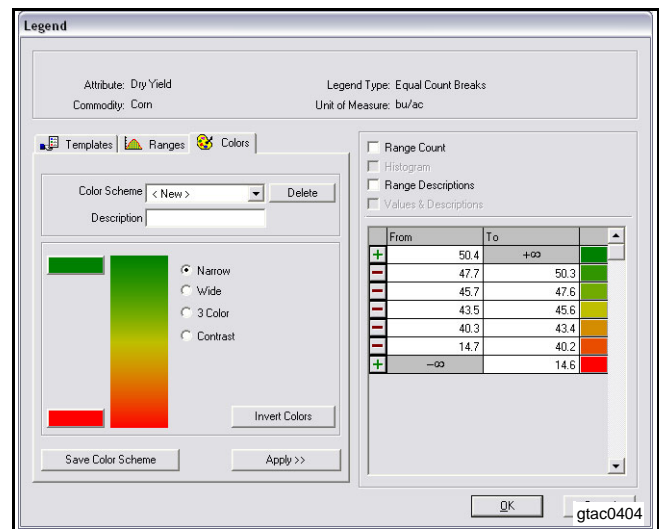
- Narrow
- Wide
- 3 Color
- Contrasting

Save by:

- Naming in Description box
- Clicking on Save Color Scheme
  - Saved schemes are available on the Color Scheme drop down window

Change colors by:

- Using color boxes to the left of the color bar
- Using Invert Colors button to reverse order



**FIG. 23**

## MARKER SYMBOLS

Marker Symbols button



**FIG. 24:** The **Markers** button allows the overlay of recorded data with markers symbols. This information can assist in determining the reason behind high and low yield data. Markers can be named in the tractor terminal and then edited in the Marker Symbols Legend. Markers will only appear on yield maps if the desired marker is checked. Markers can also be added within the software and then be brought to the tractor terminal, where the desired marker can be selected



**FIG. 24**

## Information Tab

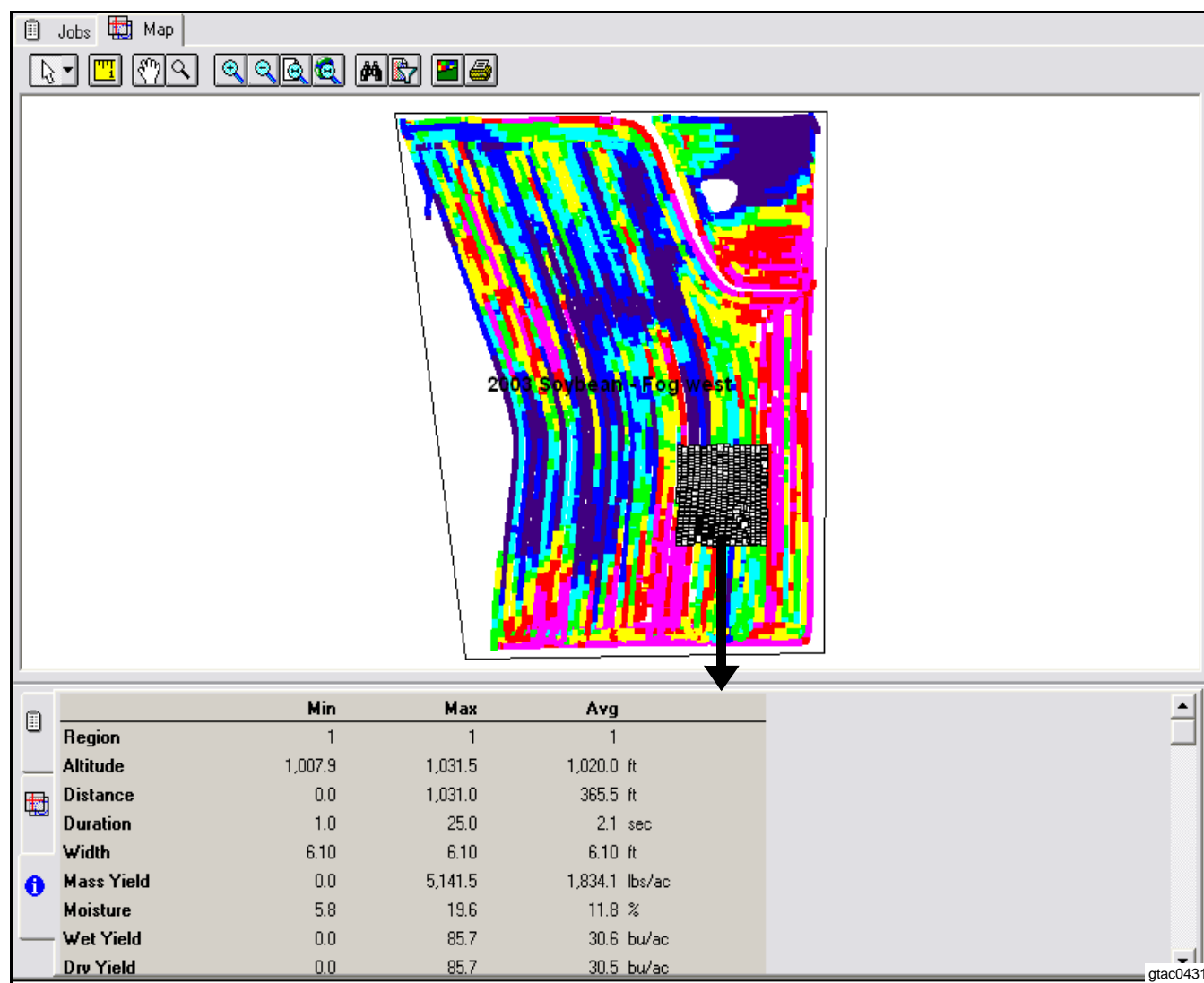


FIG. 25

**FIG. 25:** The **Information** tab displays summary information about all or part of a mapped job. Using one of the selection tools, you may collectively select data points. The Information tab summarizes the maximum, minimum and average values for each variable in the selection.

## Application








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### BOUNDARY EDITING

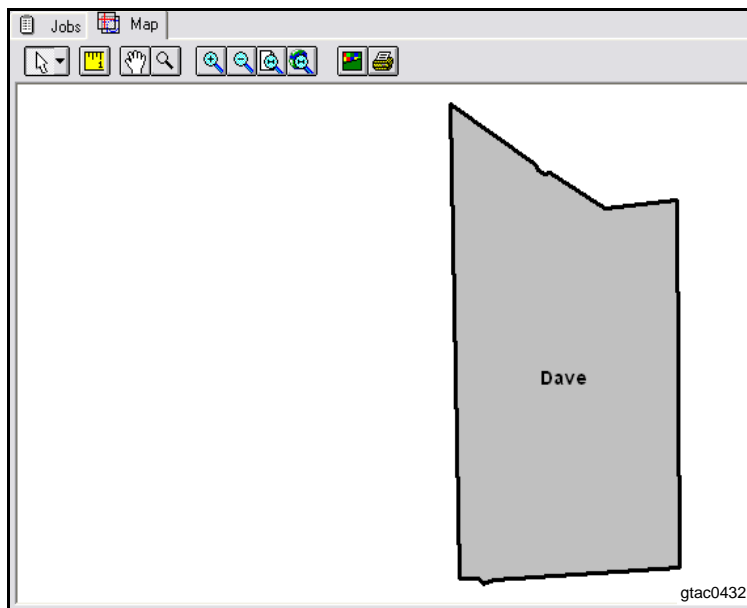
Two types of boundaries can be created or edited: **Field** and **Enterprise** boundaries. Field boundaries show the entire perimeter of the field. Enterprise boundaries are areas within the field, where the crop was actually grown.

#### Boundary Editing Buttons

When in the boundary editor, the following buttons are available:

	<b>Node Edit Tool</b> - edit nodes or points located in the boundary.
	<b>Include Tool</b> - include a rectangle, circle or polygon into the boundary
	<b>Exclude Tool</b> - exclude a rectangle, circle or polygon from the boundary
	<b>Import Shape File</b> - import a polygon shape file for a boundary
	<b>Auto Draw</b> - automatically draws boundary around all points associated with check-marked job
	<b>Save and Close Editing</b> - save changes made to a boundary and close editing session
	<b>Cancel Changes and Close Editing</b> - close session without saving changes

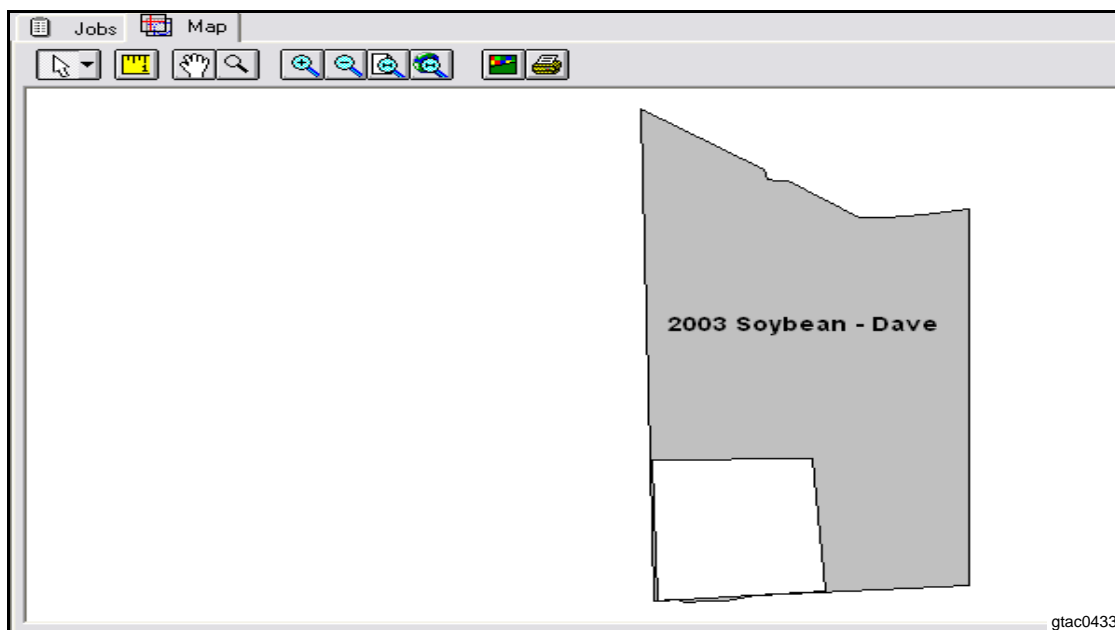
## Field Boundaries



**FIG. 26**

**FIG. 26:** Field boundaries are created or edited by right clicking on the Field's name and selecting Edit Boundaries. Another way to edit a boundary is to right click within the boundary, when no job data is displayed, and selecting Edit Boundaries.

## Crop Enterprise Boundaries



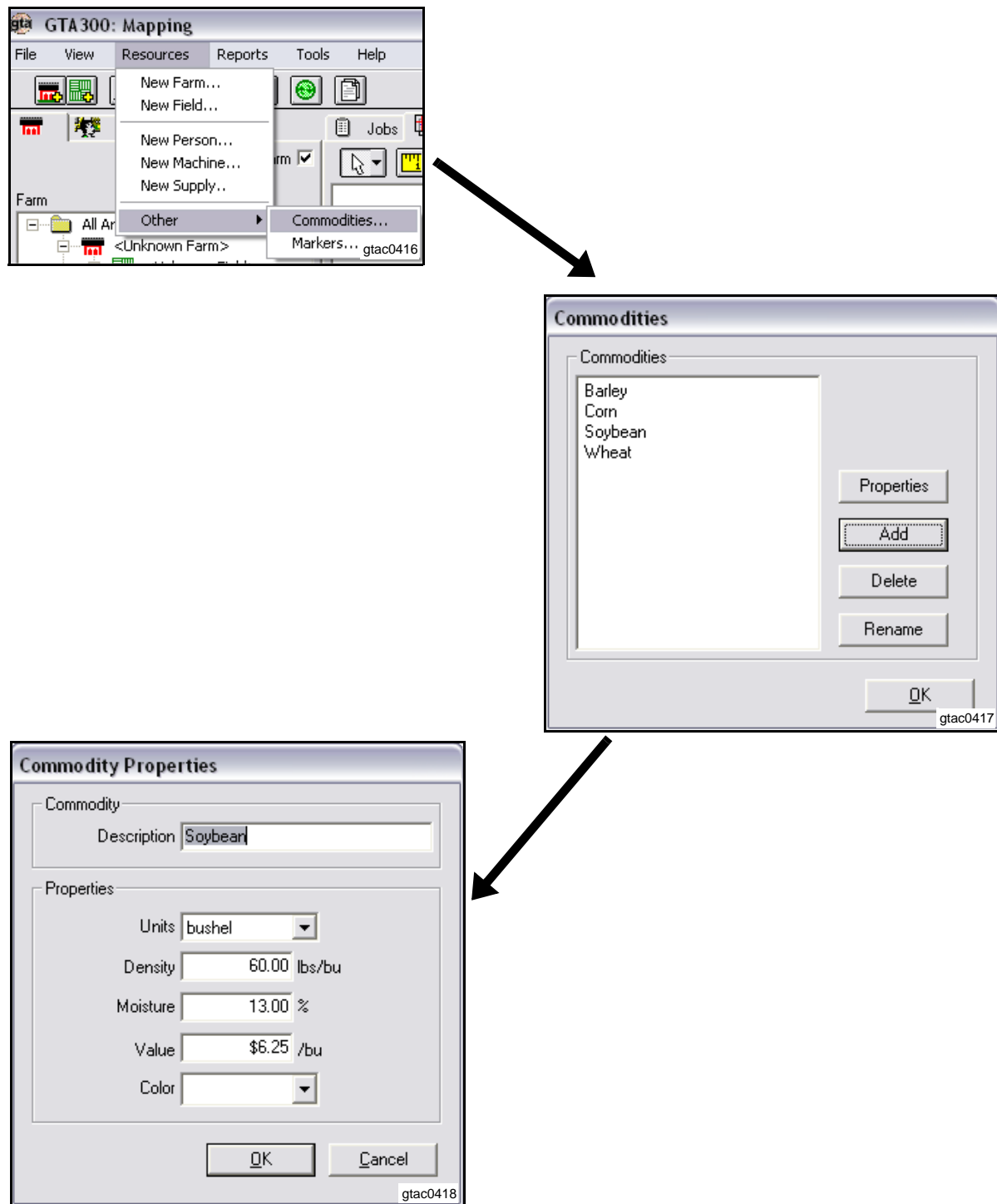
**FIG. 27**

**FIG. 27:** Crop Enterprise boundaries are created or edited by right clicking on an enterprise and selecting Edit Boundaries. Another way to edit a boundary is to right click within the boundary, when no job data is displayed, and select Edit Boundaries.

## Application

### Commodity Colors

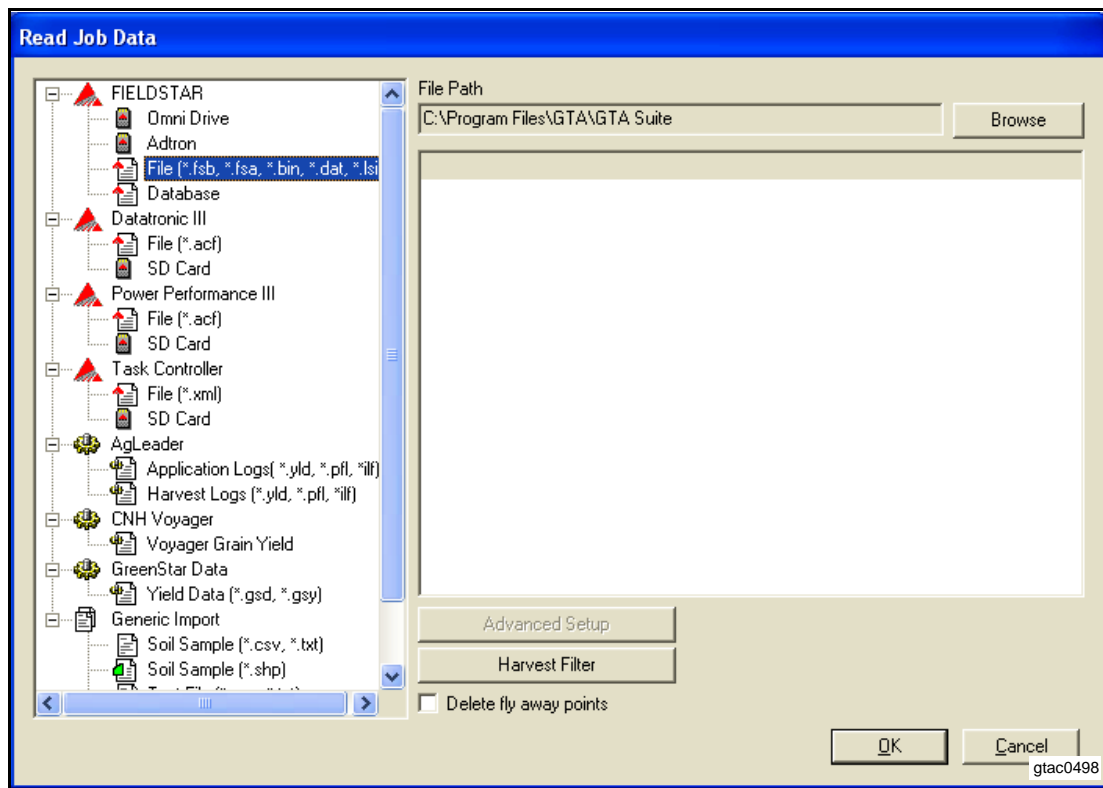
**FIG. 28:** Assigning commodity colors can help distinguish between crops. Clicking on the Resource menu, selecting Other and choosing Commodities will bring up the Commodities window. Selecting a commodity and clicking Properties, will bring up the Commodities Property window allowing colors to be assigned.



**FIG. 28**



## IMPORTING DATA



**FIG. 29**

**FIG. 29:** Harvest data from third-party vendors may be imported for analysis. Data cannot be viewed on a map unless it has geo-referenced points. Clicking on the Read Job Data button will bring up the Read Job Data window to select the type of third party monitor data to import.

# Application

## Filtering Options

### DELETE FLY AWAY POINTS

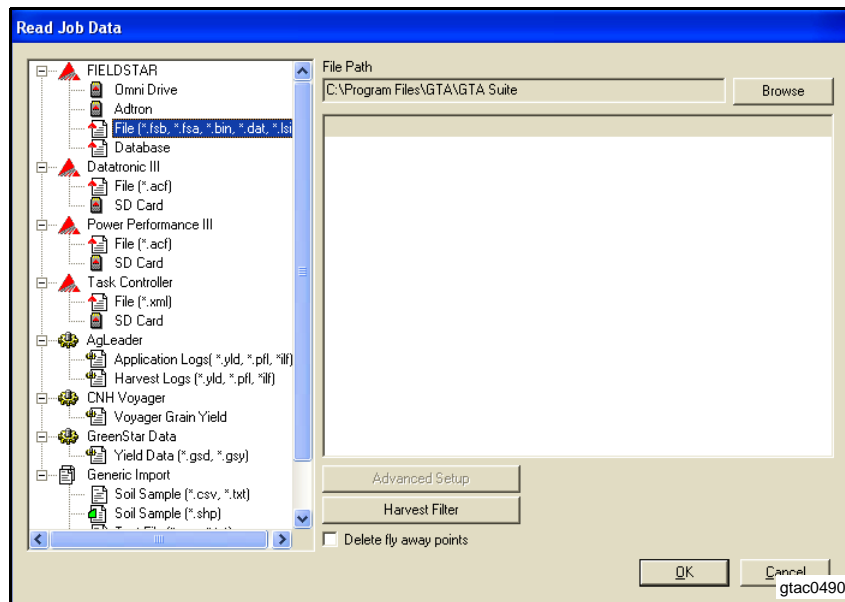


FIG. 30

**FIG. 30:** Checking the Filter Fly Away option in the Read Job Data window removes stray points from the imported data. Stray points are those that are far away from the majority of the data recorded. This feature allows random points, left by the GPS, to be removed.

### HARVEST FILTER

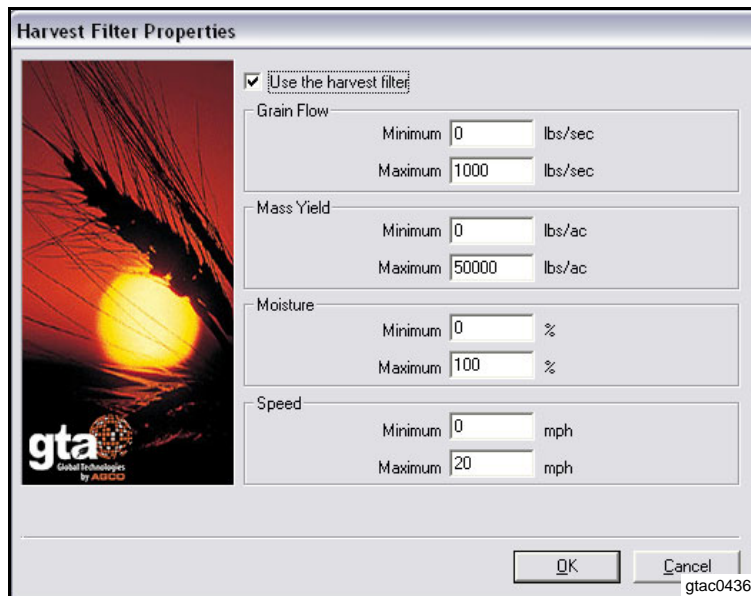


FIG. 31

**FIG. 31:** The Harvest Filter (1) can be accessed by clicking on Harvest Filter button in the Read Job Data window. This option allows all data, during import, to be filtered with user specified criteria. After importing, individual jobs can be further filtered by using the Filter tool in the Map Tab Toolbar.

## MAP REPORTS

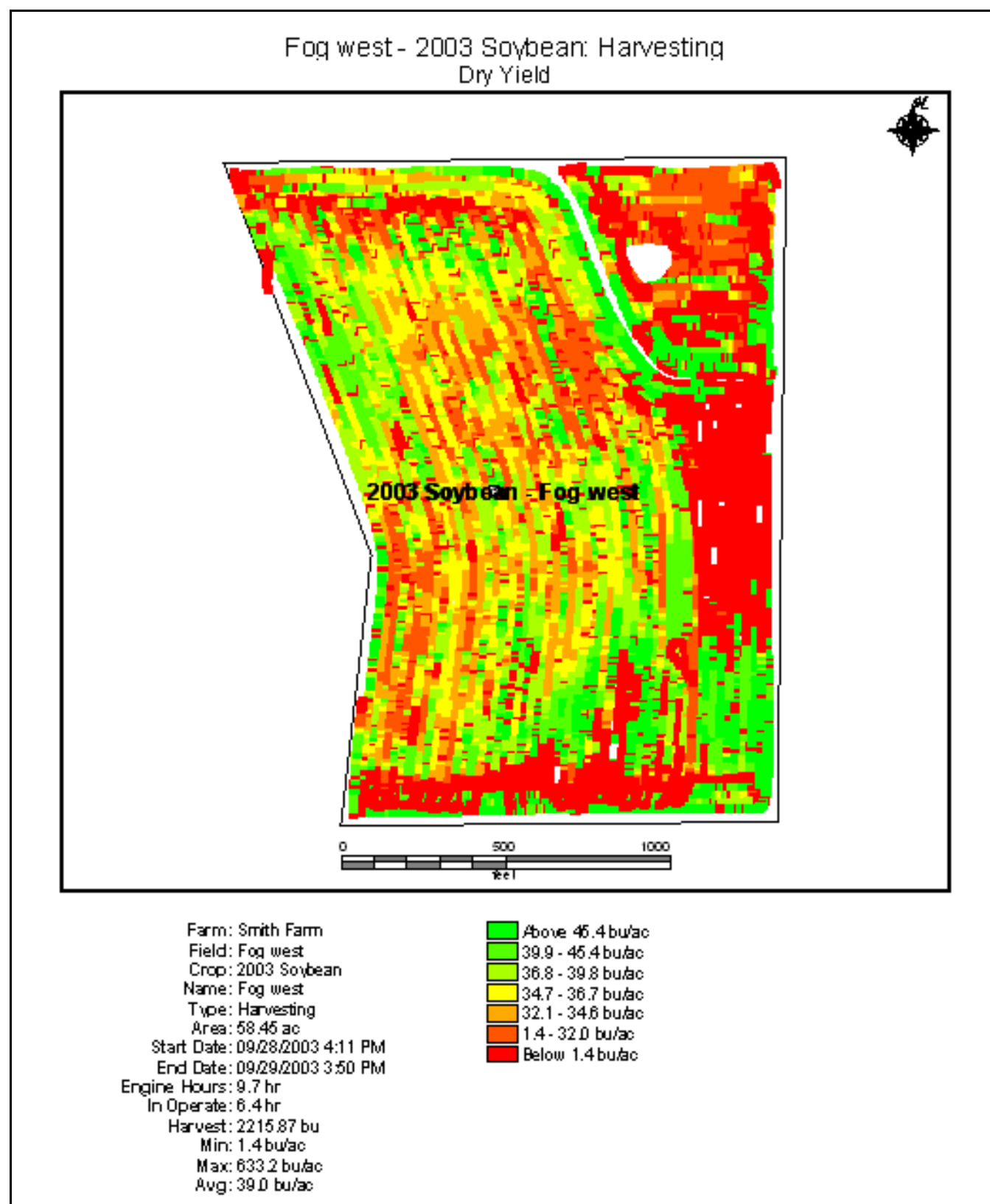


FIG. 32

**FIG. 32:** Clicking on the **Map Report** button generates a detailed report of mapped information to be viewed or printed.



## APPENDIX A

### OUTPUT: GRID VS. CONTOUR OUTPUT

Geo-referenced Job data imported into GTA300 is usually represented as individual points. These points are displayed, by default, as square symbols. To create meaningful maps, values between points need to be estimated to create continuous coverage across the field.

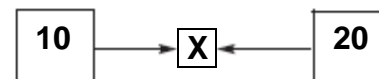
GTA300 uses a process called interpolation to estimate values and create continuous surfaces from point data. Interpolation works by using the values from nearby points to 'fill' areas between points with similar values.

**FIG. 33:** This figure shows how unknown areas can be assigned a value based on nearby points. In this case, X would be assigned a value of 15.

A gridded report is generated by creating a grid from points in a job. The value of each cell is representative of the point data within the cell. A contour report uses an additional step by building polygons based on groups of cells from a gridded report.

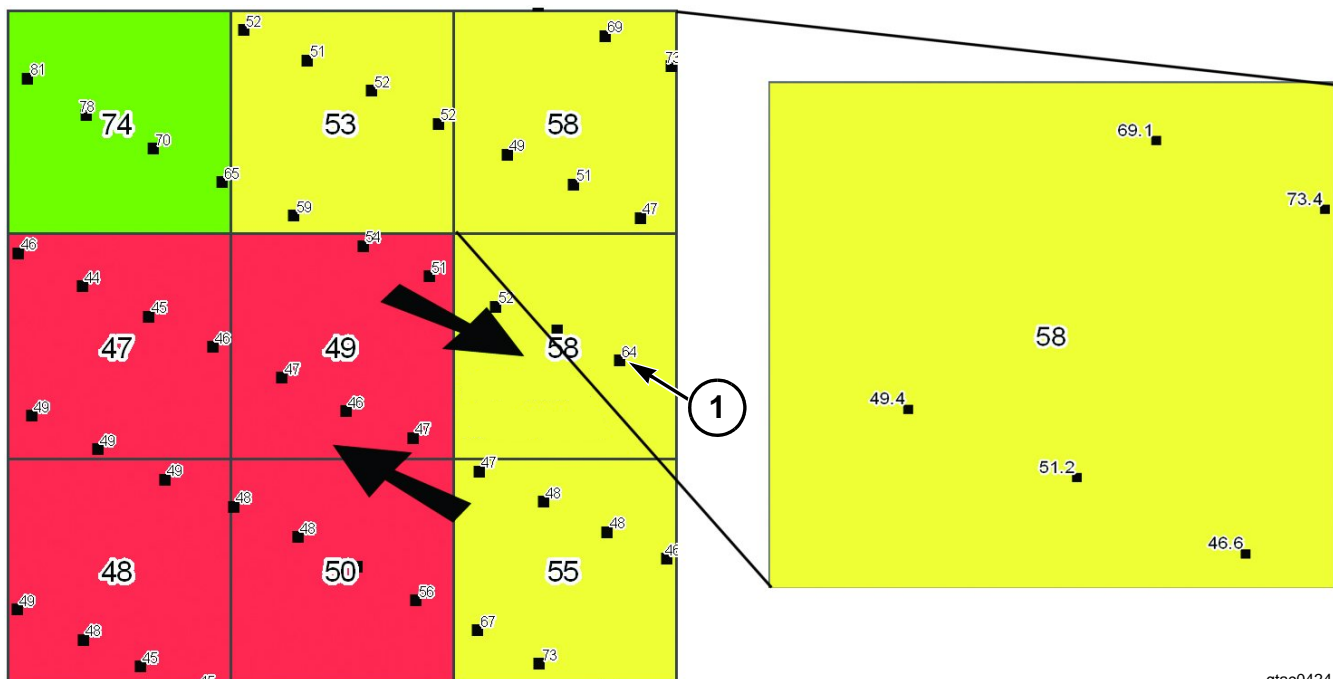
The following graphics are **generalizations** of how GTA300 generates views:

A **Grid** report is generated using points from within a job. The value of each cell is representative of the point data inside of the cell.



gtac0423

**FIG. 33**



gtac0424

**FIG. 34**

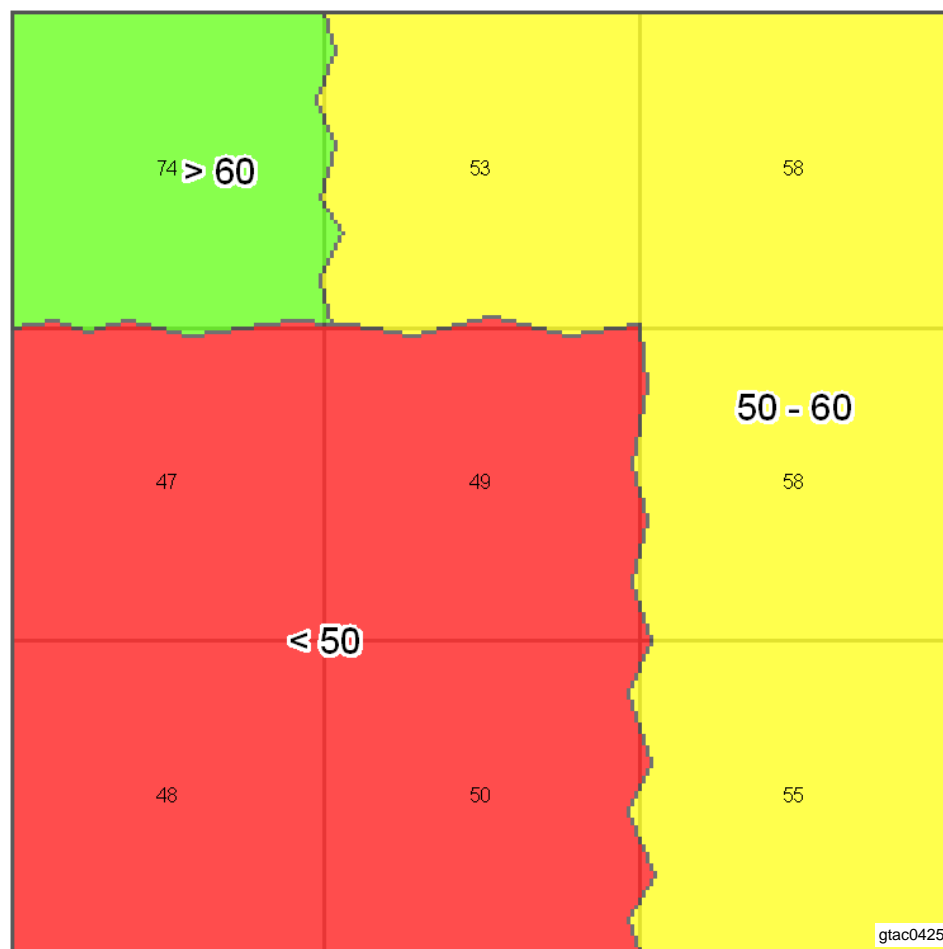
**FIG. 34:** A **Gridded View**, using Average Sampling Method.

(1) Points indicate harvester path

## Appendix A

---

A **Contour** report builds polygons, based on the cells of the Grid report.



**FIG. 35**

**FIG. 35:** A **contour view** based on the average sampling method.

## APPENDIX B

### FILL BLANKS & SMOOTHING

As noted in Appendix A, GTA300 creates maps by generating continuous surfaces from point data. In addition, GTA300 has the ability to further refine the maps it creates by assigning values to areas with no data, and by smoothing cell values across the map. Both of these features are possible through Neighborhood Operations. Neighborhood Operations are commonly used in mapping software by using a 'Spatial Filter' to adjust cell values based on surrounding or nearby cells.

#### Spatial Filtering

**FIG. 36:** To 'fill blanks' or 'smooth' the grid that is created in a view, GTA300 uses a square window (otherwise known as a kernel or filter) like this 3x3 window pictured to the right. In this process, the window is passed over the map surface, and a new value is assigned to the center cell. The center cell can be assigned different types of values (such as maximum, minimum, mean, median, or mode) based on nearby or neighboring cells ('Burrough and McDonnell, 1998). In the case of smoothing, as the window is moved across the surface of the map, a new, weighted mean is applied to the center cell.

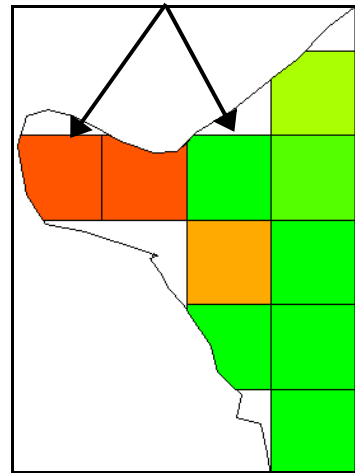
48	22	36
41	X	53
38	40	48

gtac0426

FIG. 36

#### Fill Blanks

**FIG. 37:** Frequently the periphery of the mapped area in a gridded view will have areas with no data points. By default, cells are not created for these areas as indicated by this figure. GTA300 has the ability to look at the 8 nearest cells to fill 'blanks' with cell having an appropriate, similar value.



gtac0427

FIG. 37

## Appendix B

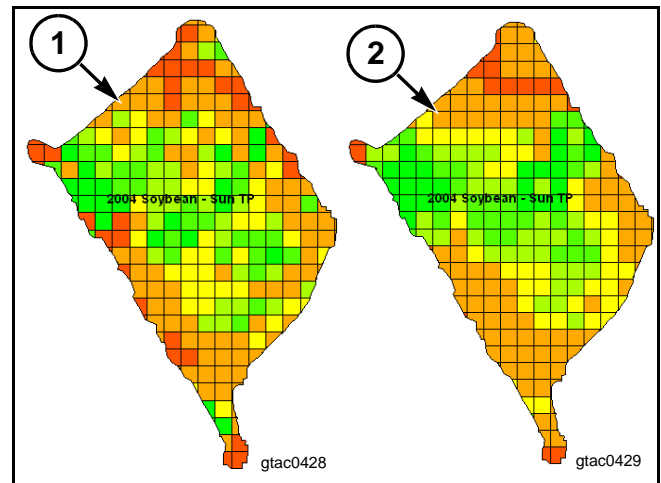
### Smoothing

**FIG. 38:** GTA300 uses a single pass filtering method known as smoothing to blend of values between cells. Users choose the level of smoothing between 0 - 100%. High levels of smoothing will reduce the quantity of unique values and the amount of variation between cells.

- (1) Zero percent (No smoothing)
- (2) One hundred percent

*NOTE: With 100% smoothing, the center cell is assigned the mean value of its 8 surrounding cells.*

<sup>1</sup>Burrough, Peter A. and McDonnell, Rachael A., *Principals of Geographical Information Systems*. Oxford University Press, New York, 1998.



**FIG. 38**



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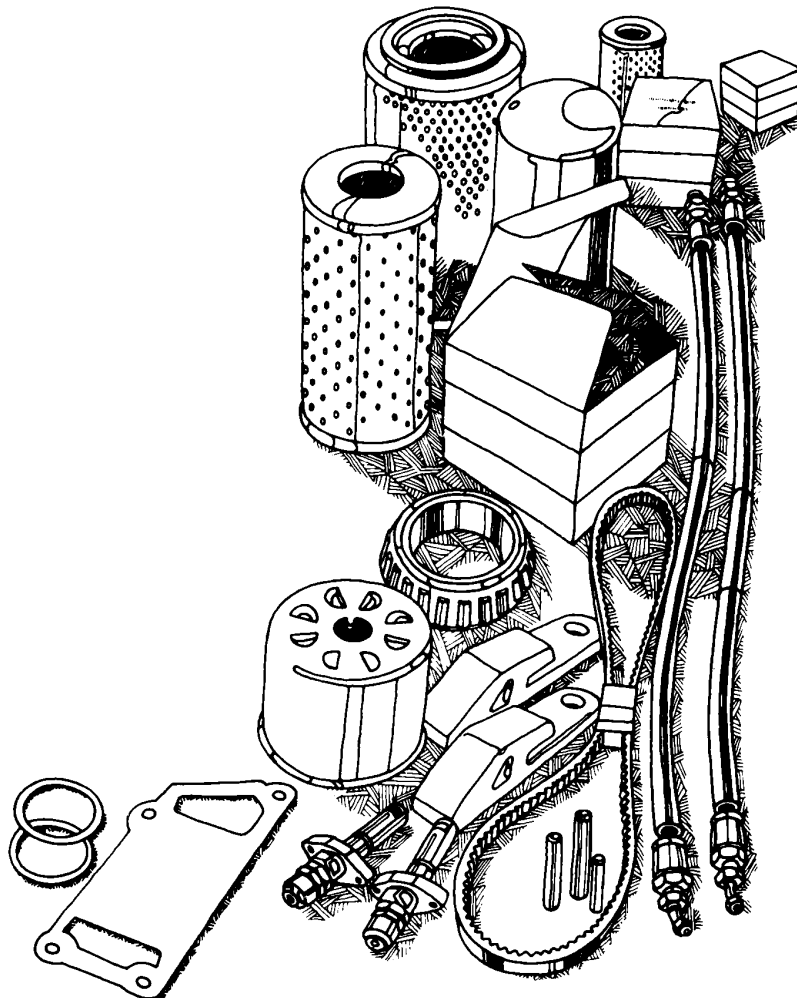
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