NDSU Extension
Geospatial Education Program

Geospatial Applications: Evaluating GIS Computer Programs for Farm Use

21 April, 2005

By John Nowatzki, Geospatial Specialist
NDSU Extension Service

Farmers and land managers who use spatial management practices in crop production need geographic information system computer programs to visualize and interpret soil and crop variations within fields. The GIS computer programs also are needed to prepare variable-rate crop-input maps. Several GIS programs, including some programs written specifically for farm applications are commercially available,

Farmers have specific functions they need performed by a GIS computer program. I will evaluate several GIS programs based on functions needed by farmers. In this column, I will evaluate Ag Leader's spatial management systems computer program. Future columns will evaluate other farm GIS programs.

To make my evaluations, I will use the following functions to make my comparisons:

- Display and layer spatial data, such as field boundaries, soil survey information and crop yield information
- Visualize and interpret crop-yield and soil-test analysis data
- Display and interpret aerial photography and satellite imagery
- Display and analyze economic data
- Prepare and analyze multiyear yield data
- Prepare variable-rate crop-input maps.

In addition to these primary GIS functions, farmers who use digital GIS data quickly learn there are many other jobs they need to do with their spatial data, such as changing map projections and cutting layers to conform to their field boundaries. A problem unique to farm GIS applications is moving data between proprietary GIS programs.

Most of the major agricultural equipment companies market GIS software that uses unique file formats that are not always interchangeable between programs. All of the GIS programs I have evaluated require significant learning time.

Generally, computer programs that have greater functionality require more effort and time to learn. I will not evaluate any of the programs for ease of use.

Ag Leader has two versions of its spatial management systems software. The two versions are SMS Basic and SMS Advanced. This evaluation refers to functions of SMS Advanced.

GIS Function	SMS Advanced Functions
Display and Layer Spatial Data	Displays and layers shapefiles, digital elevation models, MapInfo, National Elevation models, Spatial Data Transfer Standard elevation models, Tiger data.
Supported Yield Data Formats	All available yield data formats.
Interpret Yield Data	Creates grid and contour yield maps; edits yield data; correlates yield data to other layers, such as soil maps or satellite imagery.
Display Economic Data	Economic data can be displayed in tabular format and correlated to spatial layers and displayed as maps. SMS does not have the ability to import economic data from recordkeeping software. Each data record must be entered separately.
Analyze Multiple Years of Data	Displays multiple years of yield data in one multiyear average map.
Prepare Variable Rate Application Maps	Creates variable rate maps and exports them for use in Ag Leader, AgChem, MidTech and Trimble controllers. The variable rate maps also can be exported as shapefiles, MapInfo files and text files.
Display and Use Image Files	Displays gif, jpg, sid, png, tiff, bmp and wmf image file formats. Can geo-reference images and prepare normalized vegetative indexes (NDVI). I have been unable to properly display Landsat images in SMS.
Change Map Projections	SMS cannot change data map projections. It has the ability to import and display most projections. Users will need a separate GIS program to change the map projection of their data.
Clip Data to Field Boundaries	Clips image and soil files to field boundaries.
Profit and Loss Spatial Maps	Prepares and displays single-year and multiple-year profit and loss maps.

Source: John Nowatzki, (701) 231-8213, jnowatzk@ndsuext.nodak.edu