FieldTrialGIS: A Geo-reference Mapping and Data Management System Developed for Agronomic Field Trials

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The challenges of effective storage, management, and presentation of field trial data led to the development of FieldTrialGIS. This system integrates database software with an interactive web-based mapping service. Field data from south India demonstrates the potential capabilities of this working model.

Data management of field trials has been a challenge to agronomists and extension specialists while appropriately archiving, displaying, and analysing the vast amount of information that can be generated from these activities. Our experience has been that the pains taken and money spent on organising trials, collecting data, and the subsequent analysis are at risk of becoming a point of short-term market development interest only. Over time, there is a tendency to lose track of data from individual sites or to consider it obsolete or irrelevant. Given an adequate data management system, the collective power of field trial data should prove its value in identifying gaps in research—both in terms of subject matter and geographical location, as well as identifying trends in yield response, gaps in productivity, economic viability of nutrient application, or spatial and temporal trends in soil fertility.

The objectives set for the project were to standardise data input, arrange and archive data efficiently for easy retrieval, standardise site evaluation through programmed data analysis, and provide a dynamic and interactive web-based interface which can display both the scope of the data collection and key results from the site evaluations. The project began with available documented results from a network of field demonstrations with site data. This project has continued to evolve and become more refined in its design and presentation. Each revision has added new ideas into its design and the potential for incorporating more functions and outputs has not likely been fully explored to date.

Data Requirements and Flow

The data collection process is initiated by providing field research collaborators with a standard form designed to gather a list of key data from each experimental site. This core data set includes: basic descriptive information, soil test data, details on the series of fertiliser treatments, the resulting yields, and individual price data for all nutrients applied and crops harvested. Presently the system facilitates comparisons of any four treatments. Field workers are asked to provide a global position for the site using equipment now commonly available.

Use of electronic collection forms facilitates a simple integration of the site data into a Microsoft® Access™ database.

Once imported, each site is subjected to a series of programmed queries which compose the treatment comparisons for yield, economic viability, partial nutrient balance, and nutrient use efficiency (specifically calculated as partial factor productivity).
for N). This series of queries is linked to a Desktop GIS via ESRI ArcMap™. Finished maps are, in turn, exported via usmedia® MapViewSVG™ and uploaded to an internet environment (Figure 1).

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**Figure 1.** Schematic representing the flow of data for the FieldTrialGIS. Data is diverted from static storage into Access and the GIS data layers are based upon its query results. The web-based product is uploaded via export, using MapViewSVG™ software.

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**Evaluation of FieldTrialGIS**

FieldTrialGIS was evaluated using available datasets collected from 67 field trials conducted by collaborating institutions within the peninsular region of south India, including the States of Andhra Pradesh, Karnataka, and Tamil Nadu. The non-replicated demonstrations largely included treatments evaluating site-specific nutrient management (SSNM), a generalised state recommendation, and a common farmer practice. Table 1 presents a summary which isolates results from field sites comparing the treatments. Crop-wise yields and net incomes are highlighted for data collected between 2005 and 2007. Averaged across sites and years, SSNM has consistently improved yields and incomes for a range of crops compared to either the traditional farmer practice or generalised fertiliser recommendation for the state.

The use of the GIS allows for the data to be projected spatially. For example, in the case of profitability, a visual assessment of the relative effectiveness of State or SSNM fertiliser recommendations at raising the income potential for a region can be obtained (Figure 2).

Testing has found the system to be effective from data entry to the generation of its interactive map output. The database has been supplemented with field sites located elsewhere in Asia and there is potential to expand the scope of data coverage to a global scale. Readers are encouraged to view the program’s results available to date. Please find the link to FieldTrialGIS within the IPNI India Programme Portal found at http://www.ipni.net/ipniweb/portal.nsf/dx/India.

**Important notes on viewing SVG maps**

Firefox™, Opera™ or Safari™ users do not need the SVG plug-in to see SVG maps while Internet Explorer™ users have to install a free browser plug-in. The free Adobe® SVGViewer is the best to use with Internet Explorer™ which is available at http://www.adobe.com/svg/viewer/install/

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