

THE NEW GEOGRAPHY OF PLANT NUTRITION



Farmers today have a new set of tools to help them deal with the challenges of nutrient management decisions. Substantial fluctuations in prices for fertilizer and other inputs, and in prices received for crops sold, have made these tools even more valuable. Beyond the economic incentives, these tools also help optimize agronomic plans for the crop production system, and make important contributions to improving our stewardship of soil, water, and air resources.

GIS-based record keeping. Good records serve to document past and current cropping practices and help design plans for future seasons. Building records into a Geographic Information System (GIS) allows for more details to be kept about the variability within fields, important to fine-tuning inputs for the future.

Soil testing. New application options enhance the value of traditional soil tests. Systematic geographically-referenced sampling provides ability to map spatial variability in soil nutrient supply and guide variable-rate application to efficiently distribute fertilizers precisely where they are needed.

Variable-rate application. The value of variable-rate application is increased as fertilizer prices and grain prices increase. Being able to put fertilizer dollars where they will be most effective is always a good idea, but with higher prices the economic incentive is much greater. When a uniform rate is used, parts of the field get nutrient levels built beyond where there is an economic response and/or other parts do not get enough to reach optimum levels. And there are the added potential benefits to the environment of applying nutrients only where they are needed.

Digital soil survey. The soil is the most basic resource for production, and the main manageable source of variability within the field. Geo-referenced digital soil surveys are now available for almost every field and contain a great wealth of information about each soil type in a field. This information can be incorporated into the field's GIS records and used with numerous analytical and decision-aid software tools to help make management decisions.

Yield monitors. Yield monitors are now available for most major commodity crops, providing an accurate measurement of yield and its variability across the field. With GIS analysis tools, yield data can be related to the geo-referenced data on inputs, weather, pests and other scouting observations, remote sensing imagery, and digital soil survey. Compared over time, yield maps can identify yield trends and profitability of different areas of the field. Analyzing the various databases may help identify areas of a field that should be taken out of production, and others that may warrant more intensive management. Yield variability means variability in nutrient uptake and removal, and can help better define variability in maintenance fertilizer needs.

Better-informed decisions. With a growing data base of geo-referenced information to draw upon, farmers and their advisers can fine-tune management decisions to move closer to optimum levels of inputs to produce the optimum yields for maximum profit. Embracing the technology to collect and manage information, and to make better-informed decisions on nutrient management is the first step in keeping a production system profitable for each field. Similar technologies for other inputs can help further enhance profits.

These technologies for getting the right rate of the right inputs in the right place at the right time have demonstrated the increased value of better information. The cost of putting on too much fertilizer can be avoided. Perhaps more important, the greater cost (loss) from not putting on enough in parts of a field can be avoided. Using these geo-referencing tools and technologies also helps farmers reduce their contribution to environmental problems and protect the production resources that will sustain productivity for future generations.

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