# Welcome to this Focus Issue on Spatial Variability

By Terry L. Roberts and Steve Phillips

One of the objectives of the International Plant Nutrition Institute's global working groups is to advance understanding of spatial and temporal variability in agricultural systems and the impacts on nutrient management decision-making processes. Proper understanding of spatial and temporal variability as core issues and integrating them into a nutrient recommendation system can ensure that fertilizer will be used adequately and in a balanced manner. Such a process will improve productivity and result in less environmental impact as nutrient management is varied to better match local requirements.

An international survey of agronomic scientists, industry agronomists, and growers was conducted by IPNI staff to determine the most important reasons to consider spatial and temporal variability. Some of the responses were to assist in new technology development, to improve computer simulation accuracy, and to help guide nutrient management legislation. Respondents indicated that variability management is needed to ensure the productivity and profitability of crop production. Also noted was the importance of protecting environmental resources, which can be accomplished by spatially distributing plant nutrients according to changes in need.

The unpredictability of weather and its effect on crop productivity and nutrient requirements was listed as a major challenge by most respondents. One of the most frequently cited reasons for considering spatial variability was so that nutrient recommendations can be made at the appropriate scale. The number one response was that making the right fertilizer decision depends on spatial and temporal effects at the field level. Failure to consider these factors when determining nutrient sources, rates, application timing, or placement can affect fertilizer efficiency and effectiveness. It is widely accepted that not all areas of a field respond the same to fertilizer applications. Whether the source of the variability is changes in soil physical characteristics, topography, or nutrient or water holding capacity, different yield potentials exist within a field and among similar fields. Applying a uniform nutrient rate to the entire field or farm will result in some areas receiving too little fertilizer, which results in yield loss, and some areas receiving too much fertilizer, which is a concern both economically and environmentally.

This issue of *Better Crops with Plant Food* is dedicated to articles focused on research being conducted around the world to address and account for spatial and temporal issues

when managing plant nutrients. From large scale operations in North and South America to small land-holdings in China and India, growers face spatial and temporal challenges in crop production. Changes in elevation, variability in soil nutrient levels, and subsoil chemical imbalances are just some of the factors addressed in this issue. Some of the strategies and precision agriculture technologies being used to manage variability that are discussed in the following articles include grid soil sampling, geographic information system (GIS)-based mapping, electromagnetic induction, optical sensing, and satellite imaging. Examples of how large-scale fertilizer recommendation systems are being refined to more relevant and appropriate guidelines that consider spatial variability at the farm-level in India and China are also included.

With the world population growing faster than ever and the increasing demand on food production, the judicious use of plant nutrients and other agricultural inputs is as important as ever. Paying attention to spatial and temporal variability when making nutrient management decisions can help both large-scale, commercial operations and small-scale, family farms contribute more effectively to improving global food security. BC

*Dr. Roberts (troberts@ipni.net) is President of IPNI. Dr. Phillips (sphillips@ipni.net) is Regional Director, Southeast United States, and Chairman of the IPNI Spatial Variability Work Group.*

## Upcoming Events...

American Society of Agronomy-Crop Society of America-Soil Science Society of America (ASA-CSSA-SSSA) 2010 International Annual Meetings. Oct. 31- Nov. 4, Long Beach, California. www.acsmeetings.org


Information Agriculture Conference 2011. July 12-14, 2011. Springfield, Illinois. www.infoag.org