

PLANT NUTRITION TODAY

2017 ISSUE 3, NO. 7

PRECISION NITROGEN MANAGEMENT HIGHLIGHTED

at the 11th European Conference on Precision Agriculture

The European Conference on Precision Agriculture (ECPA) was held recently in Edinburgh, Scotland. This 11th conference, which comes under the auspices of the International Society of Precision Agriculture (ISPA), marked the 20th anniversary of the ECPA. The conference was well attended with over 300 delegates and approximately 140 oral presentations. A wide range of topics was presented including crop and soil sensing, satellite and unmanned aerial vehicles (UAV) applications, precision irrigation, spatial crop models, decision support systems, and engineering. One of the most popular breakout sessions focused on precision nitrogen (N) management.

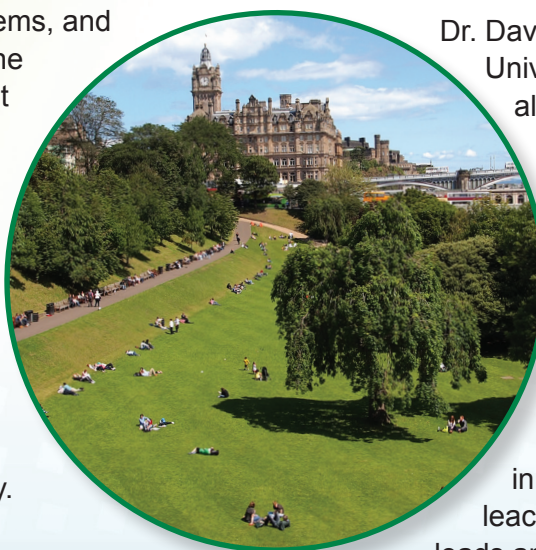
One of the highlights from the N session was a research project conducted by Dr. John Grove at the University of Kentucky. Their work looked at various methods to create nitrate-N phytoremediation areas. The results indicated that site-specific technologies could guide establishment of N scavenging cover crops; however, there were some issues with using N balance estimates from yield data. They reported that actual N content in the harvested corn grain was too variable to use published grain N concentration values to estimate N removal using the yield map and attempting to do so



ECPA
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resulted in inaccurate recommendations for the placement of cover crops. Grove indicated that yield maps might be better used to delineate areas of similar crop performance, which could then be randomly sampled and analyzed for actual grain N concentrations to provide more optimal information.



Dr. David Mulla at the University of Minnesota also presented research from the USA. His group was evaluating the effect of crop sensor-based variable rate sidedress N fertilizer applications (VRN) in corn on nitrate-N leaching, nitrate-N loads and grain yield compared with conventional N management practices. Their results showed significant reductions in nitrate-N concentrations and modeled N load losses following the VRN application. The VRN strategy also improved crop N use efficiency and had no effect on grain yield compared with the conventional uniform rate application.



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Another interesting presentation was from Dr. Daniel Kindred of ADAS, the UK's largest agricultural consultancy. They looked at the variation of N fertilizer requirement across a field and various systems to assess its predictability. Their results showed large variation in both yields and N requirements, but gross margins associated with perfectly matched N applications were modest across fields. Their conclusion was that it was much more important from an economic perspective to use precision technologies to identify an accurate average N fertilizer rate for the whole field than to account precisely for within-field variation. Another important conclusion, from an academic perspective, was that conventional replicated, randomized research trial designs are largely imprecise due to soil variation and even the trial location within a field can fundamentally affect its conclusions. They proposed a more effective “chessboard” design to address soil-related, intra-field yield variation. Kindred and other scientists at ADAS envision series of chessboard trials among a network of precision farmers to make coordinated comparisons that will bridge science and practice, empowering both farmers and researchers.

The synergy between science and practice was also the main point delivered by Dr. Ken Sudduth, Research Agricultural Engineer with USDA-ARS and ISPA Past President, during his keynote address titled “20 Years of Precision Agriculture.” Dr. Sudduth noted that the “biggest challenge going

forward [for precision agriculture researchers] is to develop and to deploy systems that help farmers turn data and information into decisions.” He cited several technological advancements that have occurred over the past two decades but pointed out that “technology can't replace people” and that “models and decision support systems won't replace common sense.” He challenged the largely academic audience to look toward the future of agriculture with a “focus on continuing to improve our understanding of the precision agriculture system and package that understanding to be implemented [on the farm].” He mentioned several key components to achieving this goal including:

- Data sharing
- IP neutral relationships
- Demonstration farms
- Focus on all pillars of sustainability (economic, environmental, and social)
- Balance between basic and applied research

In closing, Dr. Sudduth emphasized the importance of bringing together the public sector, researchers, agronomists and other trusted advisers, equipment companies, and non-traditional ag partners like data services and big technology to develop and foster the partnerships necessary for a successful future for agriculture. Precision agriculture is rapidly becoming “mainstream” and will play a greater and greater role in the crop production industry. Research will continue to be necessary and academic events like the ECPA are valuable for reporting new discoveries.

The next major academic conference on this theme will be the 14th International Conference on Precision Agriculture, June 24-27, 2018, in Montreal, Quebec, Canada (ispag.org). Another great opportunity is the annual InfoAg Conference. InfoAg is the premier precision agriculture event focused on the critical connection between research and practice. It will be next held July 17-19, 2018 in St. Louis, MO (infoag.org).