

NUTRIENT MANAGEMENT: INTEGRATING SCIENCE, PRACTICE, AND POLICY TO IMPROVE AGRICULTURE AND THE ENVIRONMENT

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Nutrient management has always been a key component of agricultural planning. Decades of research have developed and refined efficient, economic means to optimize plant nutrition and thus increase crop yields. Government advisory agencies and private agricultural consultants have been able to transfer much of the nutrient management research into best management practices (BMPs) that are well-accepted by farmers today. Concepts such as realistic yield goals, soil testing and plant analysis as predictive and diagnostic tools, selection of the best nutrient sources, nutrient application methods and timings for different crop rotations, and monitoring the success of a nutrient management plan are widely regarded as sensible, cost-effective practices by most farmers.

Unfortunately, despite the long-term efforts in research and technology transfer to improve the efficiency of nutrient management, national analyses of ground and surface water pollution consistently identify agriculture as a major nonpoint source of nutrients to other sectors of the environment. These reports, in combination with a series of local or regional events, such as fish kills, harmful algal blooms, accidental discharges of manures from lagoons into streams and rivers, high nitrate concentrations in aquifers and rivers used as drinking waters, and soil test summaries showing large and increasing percentages of soils rated as “excessive” in phosphorus have heightened public awareness about agriculture’s role in nonpoint source pollution.

Three broad responses to these growing environmental concerns have occurred in the U.S., and many other countries, since the mid 1990's. First, nutrient management research focused on protecting environmental quality has intensified and become more multi-disciplinary. Second, many countries, or individual states, have adopted laws and regulations that now mandate improved agricultural nutrient management planning. And, third, the interactions between scientists, advisory and regulatory agencies, and policy-makers have expanded, in a concerted effort to develop economically feasible solutions to these complex agri-environmental and socio-political problems. This presentation critically analyzes the changes that have occurred in nutrient management science, practice, and policy in the U.S. in the past decade and provides an overview of the advances needed to increase agricultural productivity while simultaneously reducing the impacts of nutrients on air, soil, and water quality.