USDA-CSREES 2006 National Water Quality Conference

Soil and Plant Testing For Reducing Nitrogen Losses from Croplands

Few soil properties have received as much attention as soil N because of its importance to plant productivity and increasingly, its significant role in the global N cycle. Countless approaches have been applied to quantify the amount of soil N that is readily available to plants and/or the N contained in substrates, including microbes that is likely to be mineralized during a relevant time period. Time frame and scale of interest can and do vary notably among studies and related methods sometimes yield results that support seemingly contradictory conclusions. The variety of overlapping, and sometimes confusing terminologies and strategies that are now applied to assess soil N supply will be reviewed with the conclusion that estimates of biologically active soil N that rely solely on estimates of N stock size will never be adequate. This is because the availability of labile N stocks to plants, microbes and soil fauna, and their susceptibility to environmental losses, is highly context dependent. Best management practices should focus on soil N management to achieve environmental and productions efficiencies. At present, the uncertainty that exists surrounding the science of soil N assessment presents a real challenge for management. Strategies seeking to supply N to a given crop in a single year have emphasized yield and simplicity. Up -to-date approaches consider N costs in their calculus. Risk of economic loss and the desire to deliver a clear and accurate message encourage advisors to adopt a status quo approach to management. Extension programs need to be encouraged to discuss the complexities and trade-pffs associated with choices. To improve N management, technical strategies must account for the plant, soil and environmental factors that regulate N dynamics. This information must support management strategies that account for the consequence of choices over longer time frames.

Author: Michelle Wander