Society Science

System for Using $^{15}\text{NH}_3$ in Field Research

Although direct application of anhydrous $\text{NH}_3$ is a common practice for Midwestern corn production in the USA, field studies utilizing $^{15}\text{N}$ to quantify nitrogen uptake efficiency have long been impeded by the difficulties and safety hazards inherent to a liquified gas that must be handled and applied under pressure.

An article recently published in the Soil Science Society of America Journal describes a manifold system for transferring known quantities of $\text{NH}_3$ from labeled and unlabeled sources to obtain a desired $^{15}\text{N}$ enrichment and for collecting the mixture in a tank specifically configured for knifed applications using a tractor-mounted tool bar.

Enrichments suitable for field trials were obtained for 3 kg of $\text{NH}_3$ prepared within a normal working day by a 15-fold dilution with commercially obtained $^{15}\text{NH}_3$. A collection capacity of such magnitude represents a 3,000% upscaling over systems previously described for this purpose, providing an essential prerequisite for field plot research to realistically assess the fate and fertilizer value of anhydrous $\text{NH}_3$.


Precipitation Data Analysis—What is Normal?

Many soil studies require precipitation normality analysis to avoid erroneous results related to climatic anomalies. In particular, field measurements in wetland soils must consider whether data collection occurred during normal, dry, or wet periods.

New research in the Soil Science Society of America Journal evaluates two USDA methods that determine normal precipitation ranges. The Climate Analysis for Wetlands Tables (i.e., WETS) method defines normal precipitation as occurring between the 30th and 70th percentiles of a 30-year record. Alternatively, Soil Taxonomy defines normal precipitation as the long-term mean precipitation ± one standard deviation. The approaches were compared across 30 geographically diverse locations reflecting all soil moisture regimes. Results indicated that the Soil Taxonomy method computed normal precipitation ranges approximately twice as large as the WETS method.

Differences were driven by the failure of the Soil Taxonomy approach to account for abnormal distributions in precipitation data and the influence of infrequent, high-precipitation events on the Soil Taxonomy method results. Three case studies demonstrated that wetland soils would be more frequently (and potentially erroneously) identified using the Soil Taxonomy method. As a result, the WETS method is recommended in soil studies analyzing precipitation normality.


Hydric soil identification sometimes involves collecting water table measurements. When doing so, the soil must be saturated within 30 cm of the surface when the precipitation is within a normal or drier-than-normal range. Photo courtesy of John A. Kelley, USDA-NRCS.