RESUMEN

USE OF IMPROVED NITROGEN FERTILIZER MANAGEMENT PRACTICES TO INCREASE YIELDS AND NITROGEN USE EFFICIENCIES IN DIFFERENT INTERNATIONAL SYSTEMS

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Nitrogen (N) fertilizer is the most important fertilizer worldwide; not only does it contribute to increased yields across the majority of the world's cropping systems, but it is also essential to global food security, and application of N fertilizer contributes to increased economic returns of farmers across the world.

However, over application of N fertilizer increases losses of reactive N to the environment via pathways such as leaching (e.g., nitrate [NO3-N]), atmospheric pathways (e.g., ammonia [NH3-N] volatilization, nitrous oxide [N2O-N] emissions, denitrification to dinitrogen gas [N2] and other atmospheric gases), and transport in surface runoff (organic N, NO3-N, and ammonium [NH4-N]).

Improved N management is key for climate change mitigation and adaptation. Best management practices (BMPs) such as precision conservation/precision agriculture, conservation agriculture, and rotations with cover crops and deep-rooted crops can potentially contribute to increased yields, higher economic returns, and/or reduced losses of N to the environment.

For example, cover crops and rotations with deep-rooted crops scavenge residual soil NO3-N and cycle N to the following crop, mining NO3-N from groundwater and contributing to increased yields of the crop that follows (e.g., potatoes). Other examples of BMPs include the use of nitrification inhibitors and controlled release fertilizers, planting in narrow rows, and implementing improved irrigation water management. Use of narrow rows could increase silage and harvested grain yields and increase N use efficiency and water use efficiency. With the help of software tools such as the Nitrogen Index and NLEAP GIS, users can assess the potential effects of management practices (e.g., using organic inputs such as manure) on N use efficiencies (NUE), N cycling, and losses of N via different pathways under a given set of site-specific conditions, helping them make more informed management decisions.

There is potential to use N management to increase intensification of agricultural systems throughout the globe while reducing erosion, increasing yields, and protecting water quality to increase climate change adaptation and mitigation and strengthen food security.

Thematic area: Soil management.

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