

Article title	Nitrogen Transformation, Ammonia Volatilization Loss, and Nitrate Leaching in Organically Enhanced Nitrogen Fertilizers Relative to Urea
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Abstract	<p>New N fertilizer products-organically enhanced NS plus and organically enhanced NS plus with Fe, manufactured by using sterilized and chemically converted organic additives extracted from municipal wastewater biosolids, were evaluated for N mineralization, ammonia (NH₃-N) volatilization, N leaching, and effects on soil acidification, relative to urea. Laboratory incubations at three temperatures (20, 30, and 40 degrees C), two leaching schemes (continuous and intermittent irrigation regimes), and ammonia volatilization experiments under aerobic (upland) and anaerobic (flooded) conditions were conducted in four appropriate soils (Greenville loam [fine, kaolinitic, thermic Rhodic Kandiuults], Lakeland sand [thermic, coated Typic Quartzipsamments], Guthrie silty-clay [fine-silty, siliceous, thermic Typic Fragiaults], and Sumter clay [fine-silty, carbonatic, thermic Rendollic Eutrudepts]). The two organically enhanced fertilizers had significantly lower nitrification than urea. At all three temperature levels in Greenville soil, the lag phase during the nitrification process was 28.6 d for organically enhanced fertilizers compared to 5.5 d for urea. The longer lag phase duration with organically enhanced fertilizers could result in reduced nitrate losses. Amending Guthrie soil with organically enhanced fertilizers had NH₃-N volatilization losses (5 and 22% of applied N) significantly lower than those of the urea-fertilized Guthrie soil (33 and 58% of applied N) under aerobic and anaerobic conditions, respectively. Nitrate leaching with the two irrigation regimes in Lakeland sand was significantly lower for organically enhanced fertilizers than urea. Thus, the organically enhanced fertilizers could be an attractive N source. The environmental and food security benefits of organically enhanced fertilizers result from both recycling of sterilized and converted organic wastes (C, amino acids, and micronutrients) and minimizing the N losses from land to atmosphere and from land to water, which are characteristic of a disrupted N cycle and meet the standards on nutrient management set by NRCS.</p>
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