Nitrogen Source Effects on Ammonia Volatilization as Measured with Semi-Static Chambers

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ABSTRACT

Ammonia (NH_3) volatilization is one of the main pathways of N loss from agricultural cropping systems. This study evaluated the NH_3–N loss from four urea-based N sources (urea, urea–ammonium nitrate [UAN], SuperU, and ESN [polymer-coated urea]) surface band applied at a rate of 200 kg N ha^{-1} to irrigated, strip-till corn production systems for 2 yr using semi-static chambers (semi-open and open) to measure NH_3–N loss. The efficiency of the semi-static chambers in estimating NH_3–N loss under field conditions was determined using ^{15}N labeled urea applied at rates of 50, 100, and 200 kg N ha^{-1}. Both chamber types had similar NH_3–N recoveries and calibration factors. Immediate irrigation with 16 to 19 mm of water 1 d after N fertilization probably limited NH_3–N volatilization from surface-applied N fertilizers to a range of 0.1 to 4.0% of total N applied. SuperU, which contains a urease inhibitor, had the lowest level of NH_3–N loss when compared to the other N sources. Analyzed across years, estimated NH_3–N losses for the N sources were in the order: ESN = UAN > urea > SuperU. Both years the results showed that measurement time may need to be increased to evaluate NH_3–N volatilization from polymer-coated urea N sources such as ESN. The open-chamber method was a viable, low cost method for estimating NH_3–N loss from small field plot N studies.