Investigating the effects of soil moisture and temperature on transformation of N fertilizer in soil

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Abstract

Soil moisture and temperature conditions in Manitoba are highly variable from year to year, particularly during late fall and spring, when producers typically apply nitrogen (N) fertilizer. This variability can cause difficulty when making N management decisions, as the risk of N loss is closely tied to soil moisture and temperature. A controlled environment study was conducted to determine the effect of soil moisture and temperature on the rate of N fertilizer transformation from urea-based fertilizers. Urea or SuperU was added to pans of soil at 20, 40, 60 or 80% water-filled pore space (WFPS) and pans were incubated at 5°C for eight weeks. Inorganic nitrogen (N_i) release from N fertilizer increased with time and soil moisture, indicating a greater risk of N loss when soil moisture is high for prolonged periods. The use of SuperU tended to reduce N_i release compared to that of urea, particularly at soil moistures above 40% WFPS, indicating that the use of enhanced efficiency fertilizers may reduce the risk of N loss under these moisture conditions. Data from this study, along with related field studies, will be used to validate a decision-support tool developed to assist producers and agronomists when making N management decisions.