Optimal N Fertilizer Source and Placement for Canola Yield and Reduction of N_2O Footprint in Manitoba

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In Western Canada, farmers have increasingly adopted shallower fertilizer placement for shallow-seeded crops like canola, reducing depths from 4" to as little as 1". This practice may influence crop yield and nitrogen losses from the soil. This study evaluated the effects of fertilizer source and placement depth on nitrous oxide (N_2O) emissions and canola yield across clay (Rosser) and sandy (Roseisle) soils. Field trials tested urea applied via surface broadcasting, shallow (1"), and deep (4") mid-row banding, with and without the nitrification inhibitor eNtrench. Clay soil emitted 1.5–3 times more N_2O than sandy soil. Shallow and deep banding significantly increased emissions compared to surface application, with emissions 3–4 times higher on sandy soil and 4–8 times higher on clay soil relative to the no-nitrogen control. These trends may be related to the ammonia volatilization from the soil. Using eNtrench reduced N_2O emissions by 21–54%, though its effectiveness diminished with depth in sandy soils but was unaffected by depth in clay soils. Canola yields were 2–3 times higher on clay soil than sandy soil, reflecting the better nutrient and moisture-holding capacity of clay. However, fertilizer placement depth and the use of eNtrench had no significant effect on yield.