

DIFFERENT SOURCES AND RATES OF NITROGEN FERTILIZERS INFLUENCE CARBON MINERALIZATION, NITROGEN CYCLING, AND SOIL pH OF TWO MAJOR SOIL SERIES OF TEXAS HIGH PLAINS

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ABSTRACT

Nitrogen is regarded as the most limiting factor in agricultural production because of its complex transformation, low uptake efficiency and multiple loss pathways. Excessive use of nitrogen fertilizers is practiced for agricultural production in Texas High Plains which impacts soil health in long run. With distinct soil types that run through the region, appropriate guide on fertilization is crucial, however, the information is still lacking. Hence, this study aims to investigate how different nitrogen sources and rates can impact carbon mineralization, nitrogen dynamics and pH of two soil series of Texas High Plains. A 140-days incubation trial was conducted at Texas A&M AgriLife Research at Lubbock center using two dominant soil series; Amarillo fine sandy loam from Lamesa and Acuff loam from Lubbock which were tested with three nitrogen fertilizers sources: urea ammonium nitrate (UAN), calcium nitrate (CN-9), and urea calcium ammonium nitrate (UCAN) at three rates: 50, 100, and 150 lb/acre including a control. Soil respiration was measured at 1d, 3d, 7d, 21d, 42d, 99 d, 102d, 117 d, and 140 d after fertilizer application, where nitrogen (nitrate and ammonium) dynamics, pH and EC were assessed at different sampling events as destructive sampling. Our findings suggest that nitrogen fertilizers can bring alkaline soil towards neutrality, but CN-9 can potentially cause soil salinization if applied at higher rate. UCAN showed higher soil respiration compared to other fertilizers sources if subsequent application of the fertilizer is practiced in both soil series. Nitrification was rapid with UCAN as compared to UAN but for immediate nitrate demand upon fertilizer application, CN-9 can be a better option. In general, UCAN at 100 lbs/acre can be recommended in nutrient management for producers of High Plains but site-specific field assessment is required for overall soil health and agricultural productivity.