

## **NITROGEN FERTILIZER AND IRRIGATION EFFECTS ON SOIL AND PLANT NITROGEN DYNAMICS**

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### **ABSTRACT**

Cropping systems can be exposed to different nitrogen (N) and water availabilities for a variety of reasons. Both N and water have been shown to have both positive and negative; direct and indirect effects on soil and plant N dynamics. Given that agronomic crops require large amounts of N to achieve high yields and often acquire a majority of their N from soil nitrogen mineralization (N<sub>min</sub>), it is important to understand how nitrogen and water interactions alter soil and plant N dynamics. Our study was conducted on continuous no till corn at the USDA-ARS Central Great Plains site in Akron, CO during the 2021 and 2022 growing season. We utilized two irrigation treatments of 100% ET and 70% ET representing full water and near dryland conditions for the region, and three N fertilizer treatments ranging from 2 – 245 lbs / ac capturing low, optimal, and excess N. We used an in-situ undisturbed soil core with ion exchange resin beads to measure net N<sub>min</sub> and found that there was an N fertilizer by irrigation interaction. N-acquiring soil enzyme activity increased with N fertilizer and was not affected by irrigation regime. Plants in the water limited environment were still able to acquire large amounts of N, though that did not translate to large yield gains due to water limitations especially during reproductive growth stages. A follow up <sup>15</sup>N tracer study is being conducted to better understand what sources of N plants are utilizing under different resource availabilities.