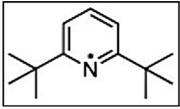


March 2019

Investment Insight

Recent Research Results



¹⁵N – Why it's important

And how NREC is utilizing this important research tool

The technical part.

¹⁵N or N-15 or 15N – all the same element – is a rare stable isotope of nitrogen. It is frequently used in NMR (Nitrogen-15 NMR spectroscopy). Nitrogen-15 tracing is a technique used to study the nitrogen cycle.

Why N-15 is important.

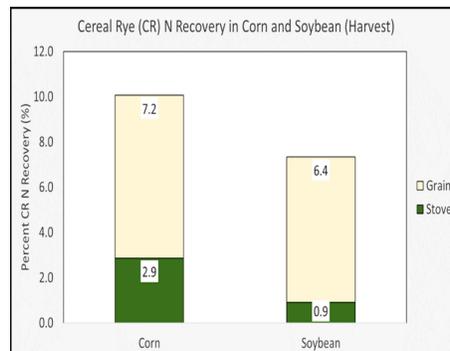
Inserting the N-15 isotope into cover crops when planted allows researchers to trace and measure how much N is available in the soil (vs from applied fertilizer) for the corn or soybean plants. It can also tell us how much Nitrogen the subsequent crops are taking up from the Nitrogen in the cover crops.

What have we learned

so far? While both the research at Southern Illinois University and at the Illinois State University's Lexington, Ill. field are both in their early stages, some information is beginning to emerge.

At Lexington, Illinois, the Cereal Rye N Release Study investigates the fate of N released from decomposing cereal rye residue using enriched ¹⁵N cereal rye shoots. In fall 2017, enriched cereal rye was planted, then terminated three weeks before planting corn and soybeans. Corn planted into the cereal rye used approximately 10% of the N within the cereal rye residue and soybean planted into cereal rye used approximately 7% of cereal rye residue N. Researchers considered that the 9% average utilization was an underestimate since they only

examined the contribution from cereal rye shoots and not the root contribution.



The research at Southern Illinois University is being conducted at its Agronomy Research Center in Carbondale, which has variable slopes and soils. During the 2017 corn season repeated soil samples were collected and analyzed for N15 recovery in the soil. The N15 recovery was higher in the rotation with hairy vetch preceding corn than the rotation with no cover crop preceding corn. The greater movement of applied fertilizer N to the subsurface horizons may be attributed to the greater number of macropores in the soils under cover crops.

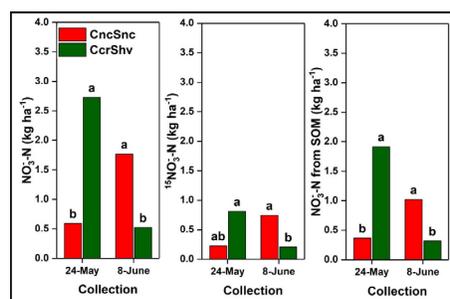


Figure 10. Comparison of mean Nitrate-N, ¹⁵N-labeled Nitrate-N from applied fertilizer and Nitrate from soil organic matter (SOM) collected using pan lysimeter during corn season 2017. Means followed by the same letter are not statistically different ($\alpha = 0.10$). Note: CncSnc is for rotation corn-noCC-soybean-noCC and CcrShv is for corn-cereal rye-soybean-hairy vetch.

ISU Objectives

1. The Cereal Rye N Release Study investigates the fate of N released from decomposing cereal rye residue using enriched ¹⁵N cereal rye shoots.
2. The Fertilizer Study investigates the impact of fertilizer N timing and cover crops on the fate of fertilizer N into the soil and following corn crop using labeled ¹⁵N anhydrous ammonia.

SIU Objectives

1. To quantify residual N fertilizer uptake by the non-leguminous cover crop and fertilizer N- use efficiency in no-till soils using ¹⁵N tracer techniques.
2. To evaluate the contribution of fertilizer and soil organic matter to N leaching under corn/soybean cropping system with and without a winter non-leguminous cover crop.
3. To quantify ¹⁵N content of surface runoff after storm events under corn/soybean cropping system with and without a winter non-leguminous cover crop.
4. To quantify decomposition rate of cover crop litter and fractionation of available N in soil, ¹⁵N released through mineralization was studied.

