

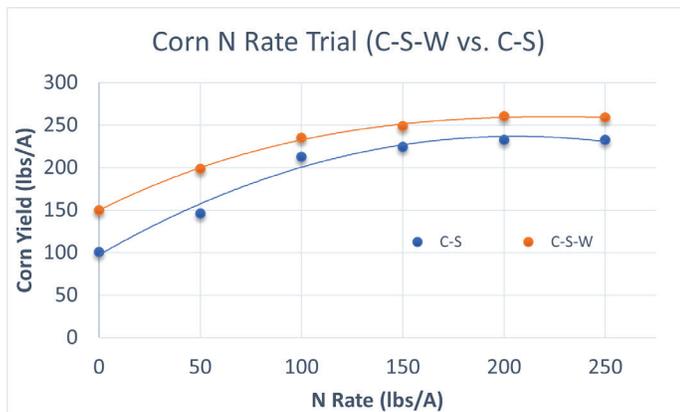
May 2022 Investment Insight

More diverse rotation provides greater crop N availability

With data from six years of N rate trials on Eric Miller's farm, Lowell Gentry is convinced that a more diverse crop rotation can enhance crop N availability. Each year an N rate trial has been established in the corn phase of both C-S-W and C-S. The agronomic system of C-S-W included double crop soybean after wheat and cereal rye after corn; whereas, C-S was managed conventionally. Fertilizer N rates used in the study were 0, 50, 100, 150, 200, and 250 lbs/A. A yield curve was calculated to determine the economic optimum N rate each year.



Photo Credit: Jason Solberg, Illinois Fertilizer and Chemical Association



N rate trial yield curves for C-S and C-S-W rotations in 2021.

highest N rates for C-S-W compared to C-S. Altogether, the combination of greater corn yields at the low N rates along with greater stalk nitrate at the high N rates indicate there is more plant available N in C-S-W than C-S. The first time researchers found greater N availability at the zero N rate in C-S-W was in 2020, suggesting this has taken several years to develop. However, 2021 was the first year researchers observed a large increase in corn yield in C-S-W compared to C-S.

Greater plant N availability in C-S-W than in C-S is consistent with the concept that a more diverse cropping system can increase soil biodiversity, carbon turnover, and nutrient cycling.

The economic optimum N rate (EONR) in 2021 was very similar between the two N rate trials (178 lbs/A for C-S and 180 lbs/A for C-S-W); however, maximum yield was 25 bu/A greater in C-S-W than C-S (258 bu/A vs. 233 bu/A). It is interesting to note that the 0 lb/A rate and the 50 lb/A rate produced 50 bu/A more in C-S-W than in C-S.

Stalk nitrate can be used as a proxy for plant N availability as stalk nitrate concentrations greater than 2000 ppm indicate N rates above the level of sufficiency and are considered excessive. Researchers found greater stalk nitrate values in the two

Corn yield and stalk nitrate for all six N rates in both C-S and C-S-W in 2021.

2021	C-S	C-S	C-S-W	C-S-W
N Rate	Corn Yield	Stalk Nitrate	Corn Yield	Stalk Nitrate
lbs/A	bu/A	ppm	bu/A	ppm
0	100.5	70	150.1	70
50	146.2	40	198.6	30
100	212.9	50	235.1	40
150	224.6	260	248.7	440
200	232.9	1470	260.6	2150
250	232.5	4970	258.9	6600



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