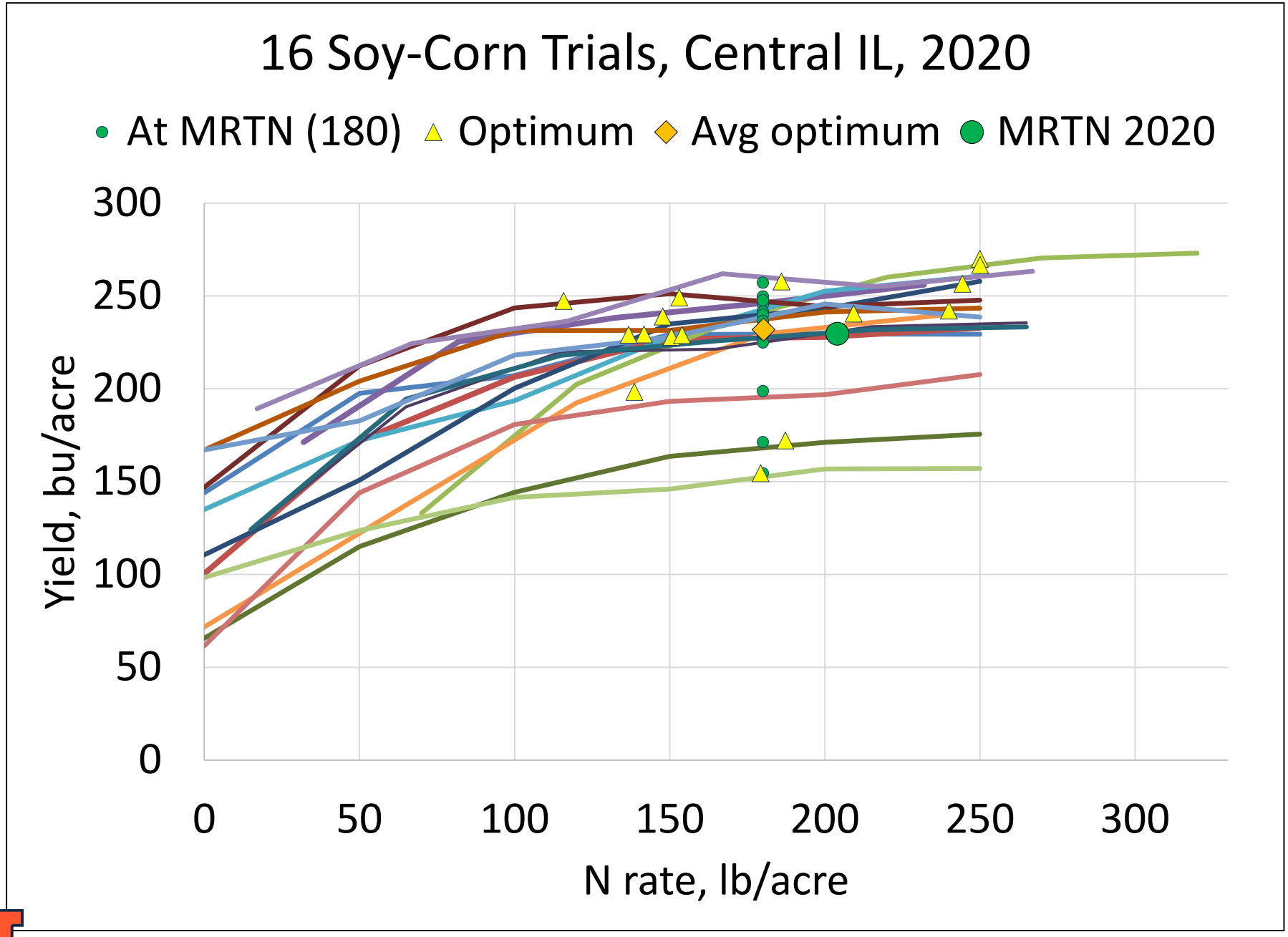
Illinois Fertilizer & Chemical Association

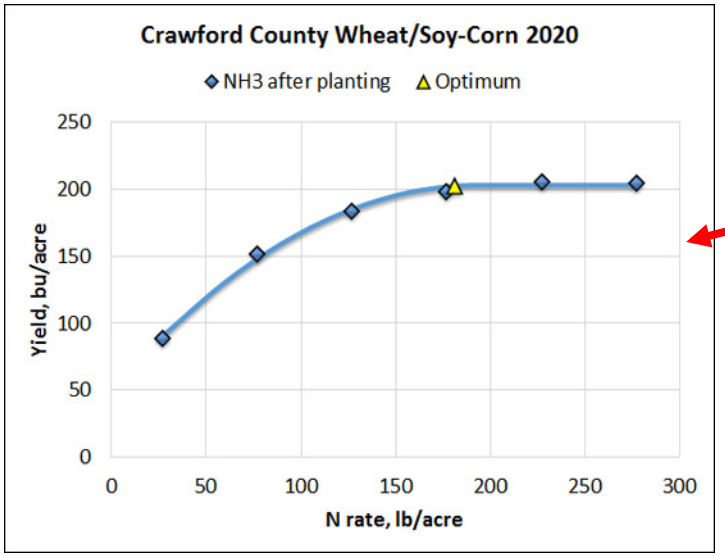
Supply • Service • Stewardship

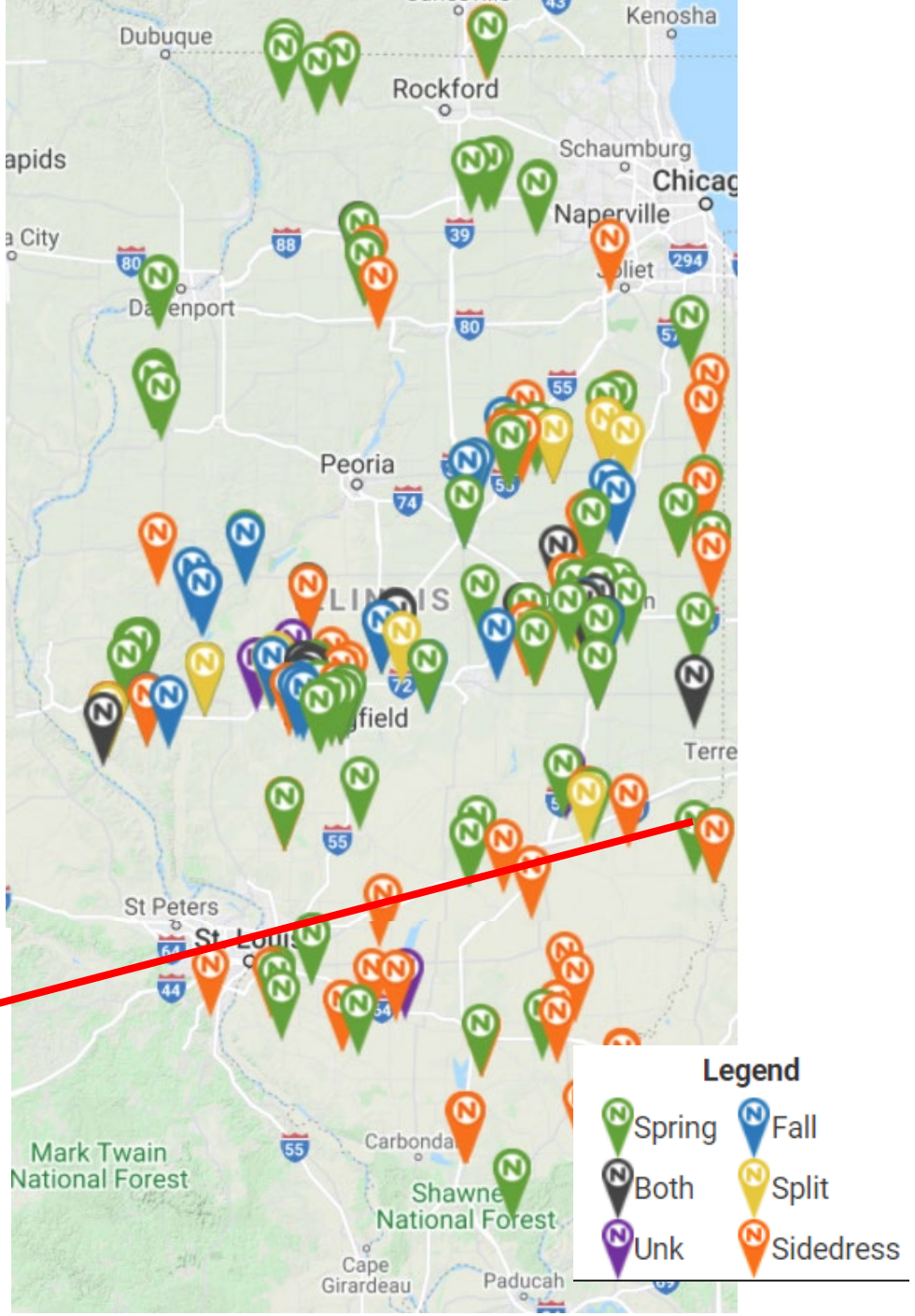
Research Is Showing Us How to Reduce Nutrient Losses in Illinois with Crop and Soil Management Techniques that are also Profitable

4RS: The Right Rate


16 Soy-Corn Trials, Central IL, 2020
At MRTN (180)
Optimum
Avg optimum
MRTN 2020
Yield, bu/acre
300
250
200
150
100
50
0
0
50
100
150
200
250
300
N rate, lb/acre

Between 2014 and 2020, we added 374 N trials to the MRTN database, 266 on-farm (from IFCA) and 108 from research center trials. Most were funded by NREC.





Illinois corn N rate calculator output for 2021

- Numbers below at N:corn price ratio of 1:10

Updated calculator: http://cnrc.agron.iastate.edu/nRate.aspx

IL Region	Rotation	Trials	2020 calculator, range		
		#	Low	**MRTN**	High
North	Soy-C	61	155	**171**	187
	Corn-C	67	190	**205**	222
Central	Soy-C	284	168	**181**	195
	Corn-C	148	187	**200**	214
South	Soy-C	126	187	**200**	215
	Corn-C	22	182	**197**	215

Lake Springfield MRTN values similar to those in Central IL

Monitoring 36 tiles

Agri Drain structure

V-notch and pressure transducer

Water sampler

Nutrient analyses
(NO_3^-, NH_4^+, P, and K)

Large replicated plots

Photo: Jason Solberg

Pattern drainage in Lacustrine soil

Tile drainage is a prerequisite for high crop yields

Tiling pays for itself in higher yields

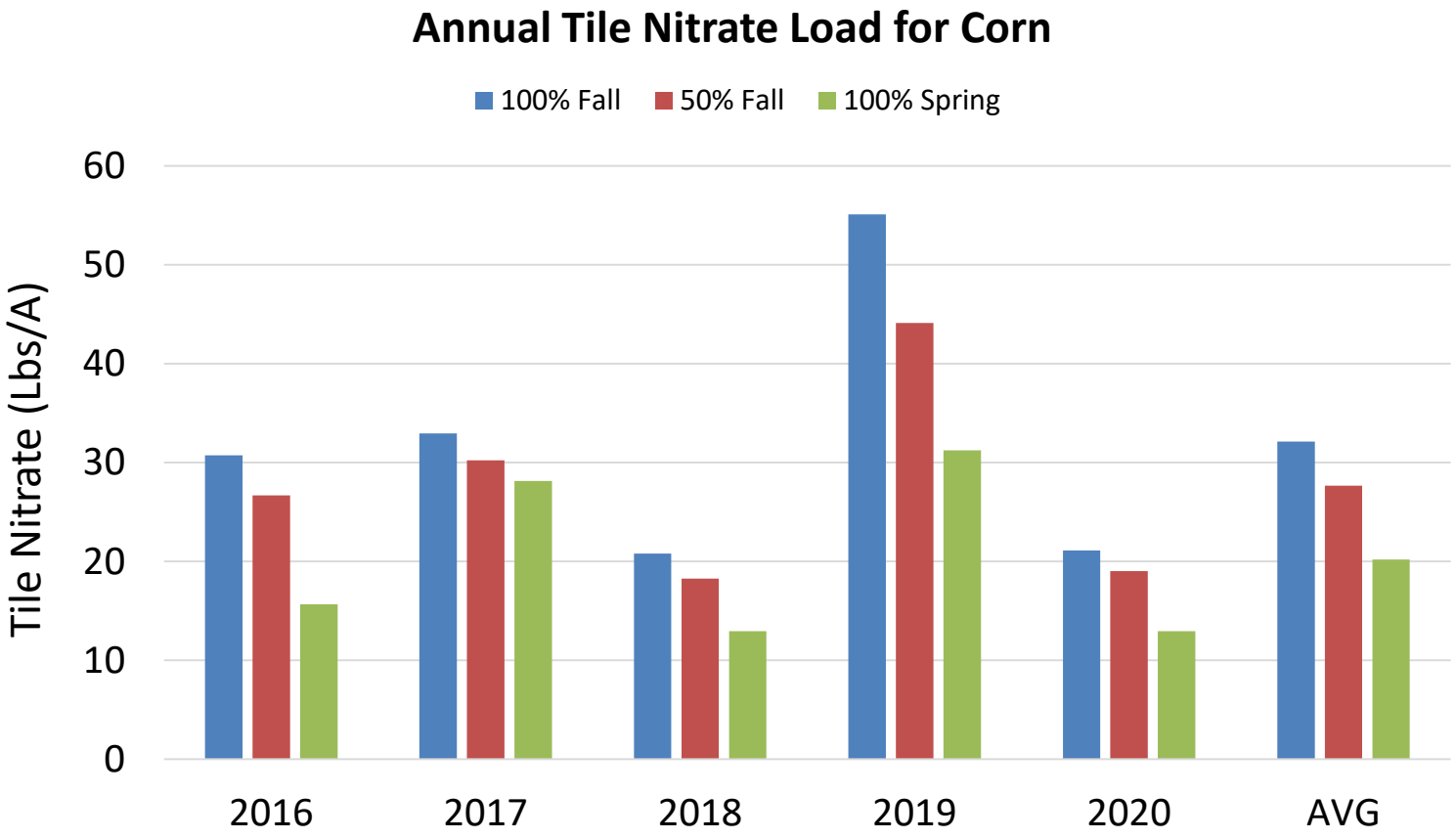
Allows for timely field work -earlier planting dates

Reduces impact of ponding

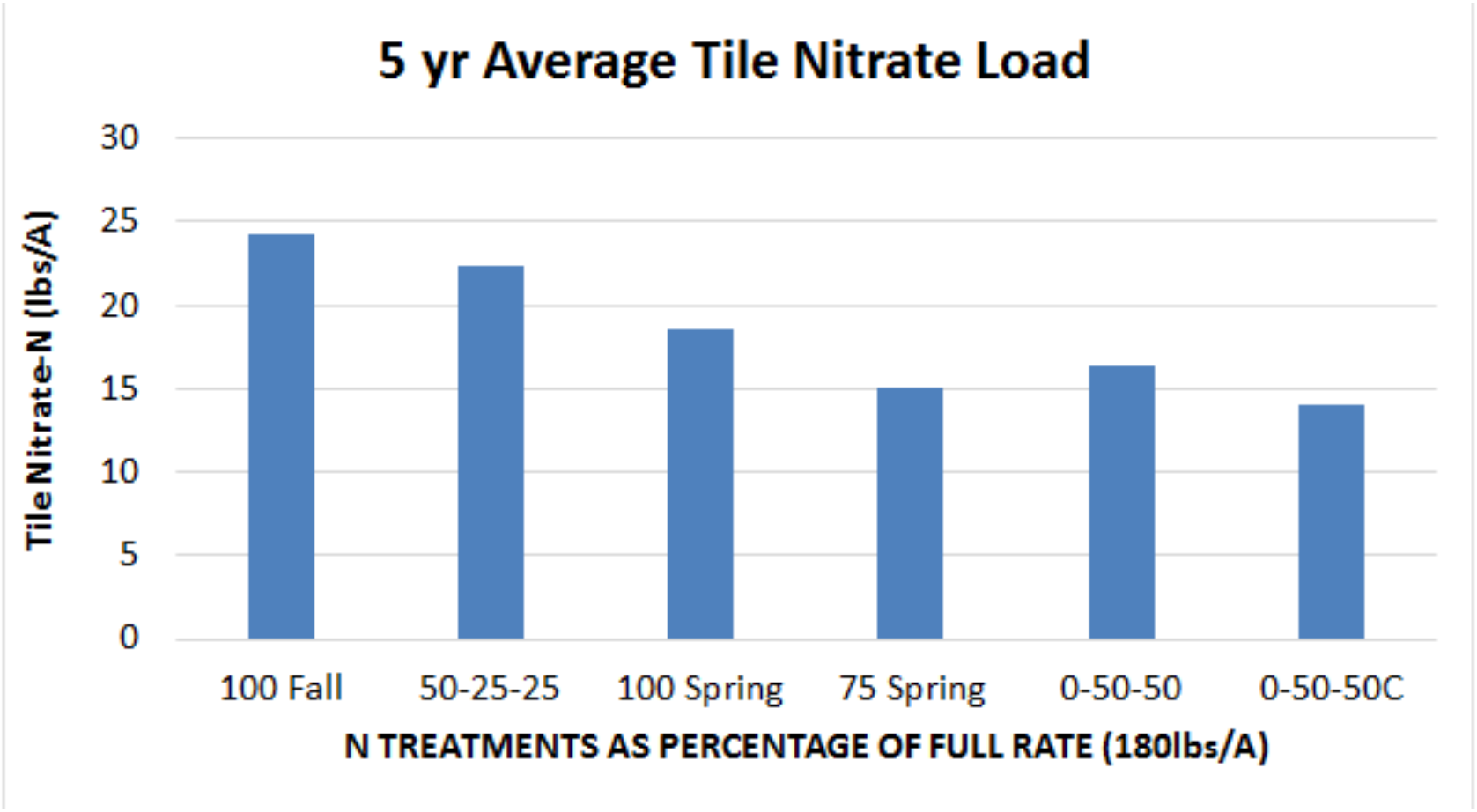
Soil aeration

Soil temperature

Timing of N Application is Important

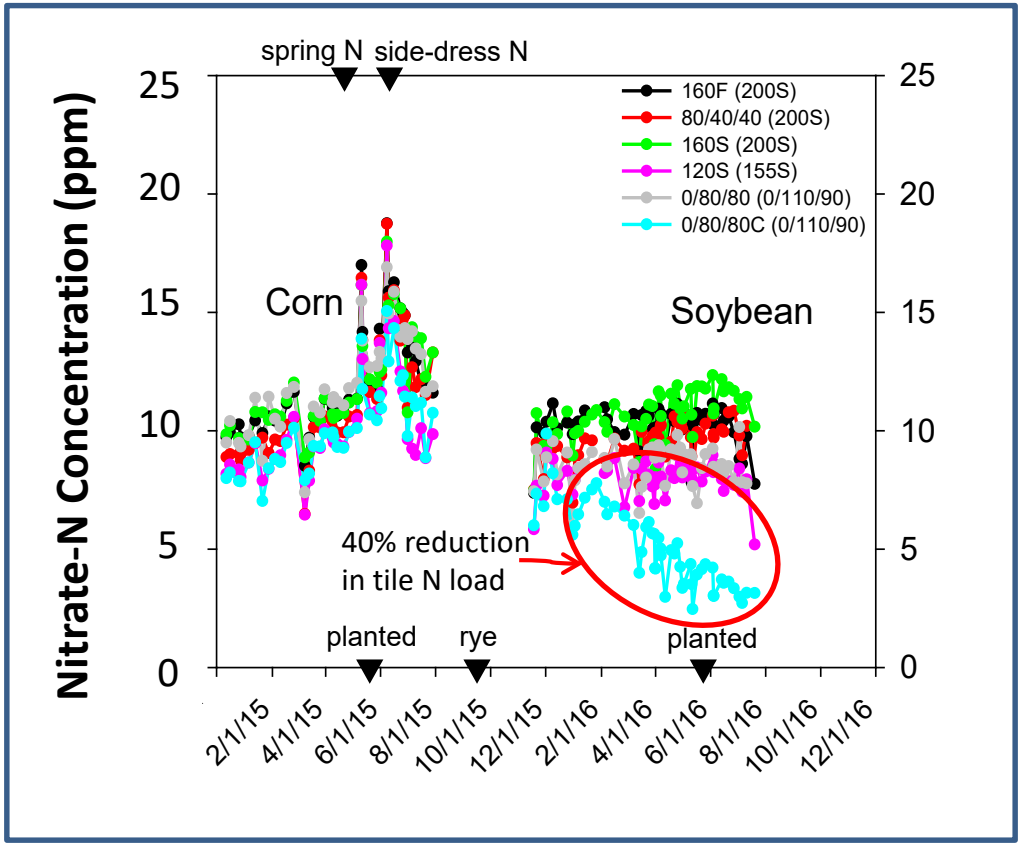


Fall N plots lost 12 lbs/A more tile nitrate than spring N plots.


5 yr Average Tile Nitrate Load
Tile Nitrate-N (lbs/A)
30
25
20
15
10
5
0
100 Fall
50-25-25
100 Spring
75 Spring
0-50-50
0-50-50C
N TREATMENTS AS PERCENTAGE OF FULL RATE (180lbs/A)

Tile nitrate concentrations following cereal rye after corn (ahead of soybean)

Cereal rye reduced tile nitrate by >40% during the warm winter of 2015-2016 compared with the other 15 tiles without cover in this study.



From this data, we produced a cover crop guide for cereal rye ahead of soybean.

Take home message

Tile nitrate is not simply a matter of excessive N fertilization.

Mineralization of soil organic matter is an important source of tile, and therefore, river nitrate (especially following soybean).

Fall N application of N lost <10% of the fertilizer, but this amount of loss represents >30% of the annual tile load, yet no yield loss

Quantity and quality of residue influences net N mineralization

Need to tie up mineralized N during non-crop growing season winter cover crop

Systems Comparison Study

Longer Rotation with Cover Crops and Bioreactors

Corn

Corn

Corn

Soybean

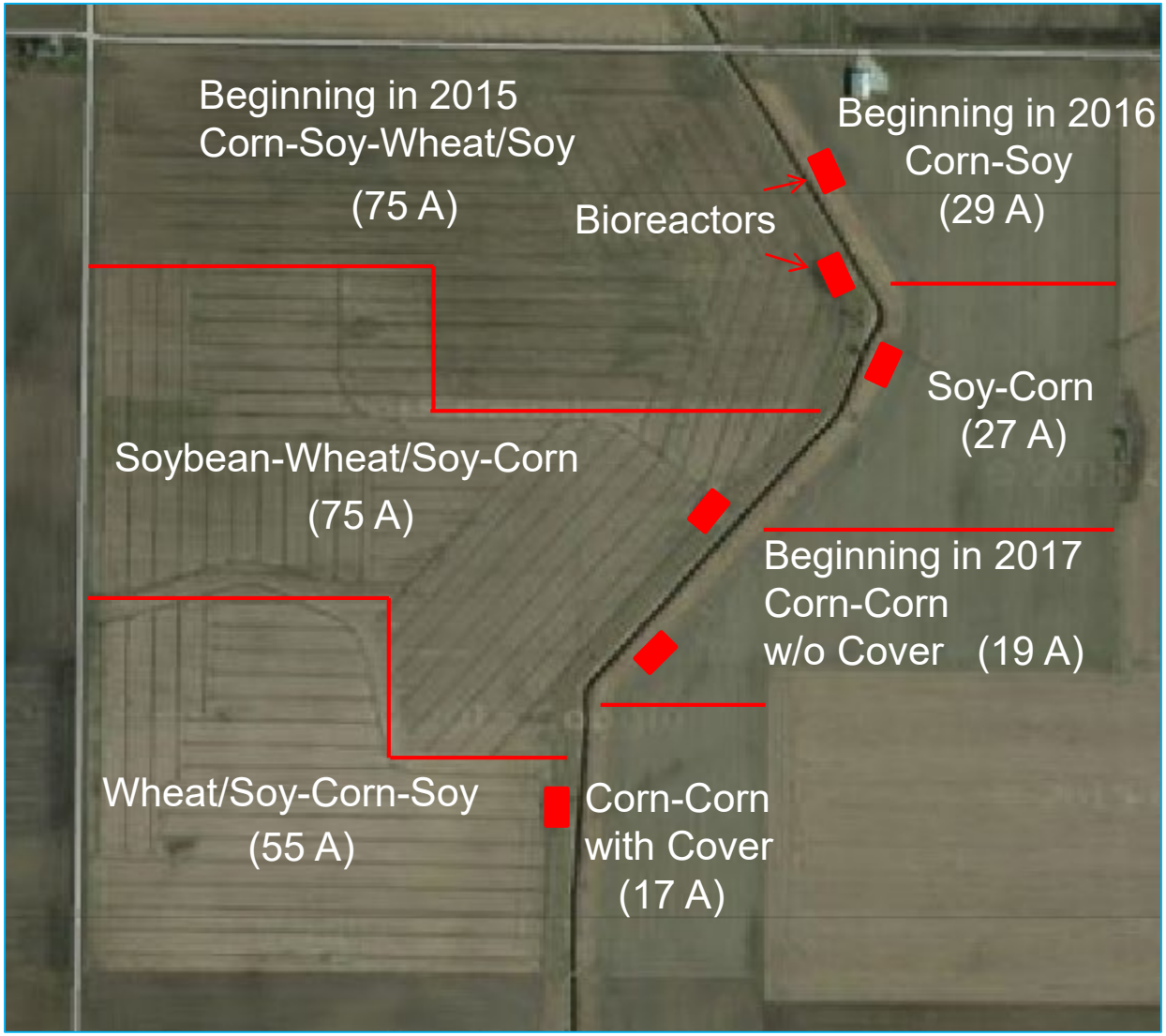
Soybean

Corn

Wheat

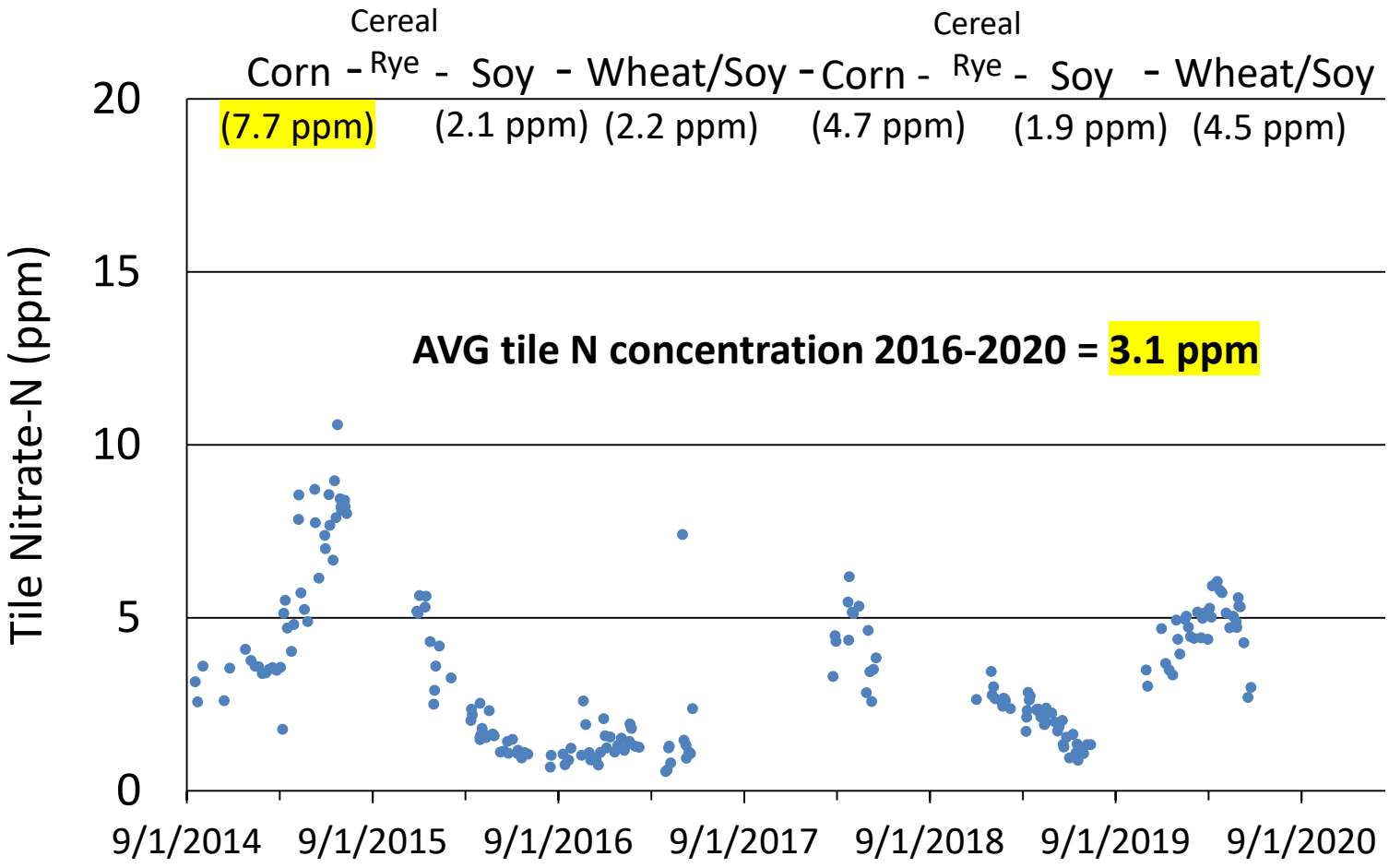
Field Design and Crop Rotation

Wheat on west side in 2014 for tiling

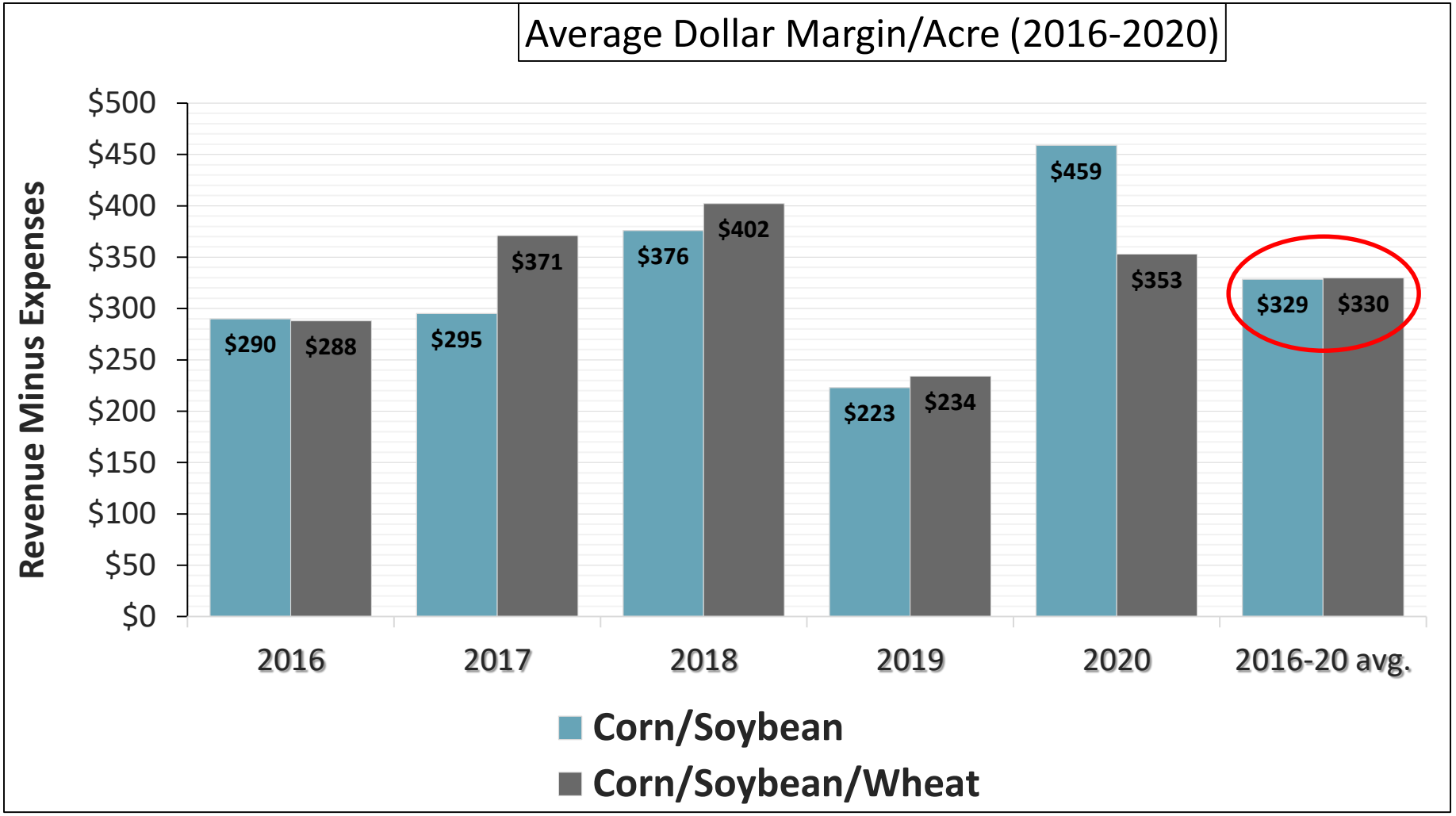


Wheat on east side in 2015 for tiling

Tile Nitrate Conc. from Corn-Soy-Wheat Rotation



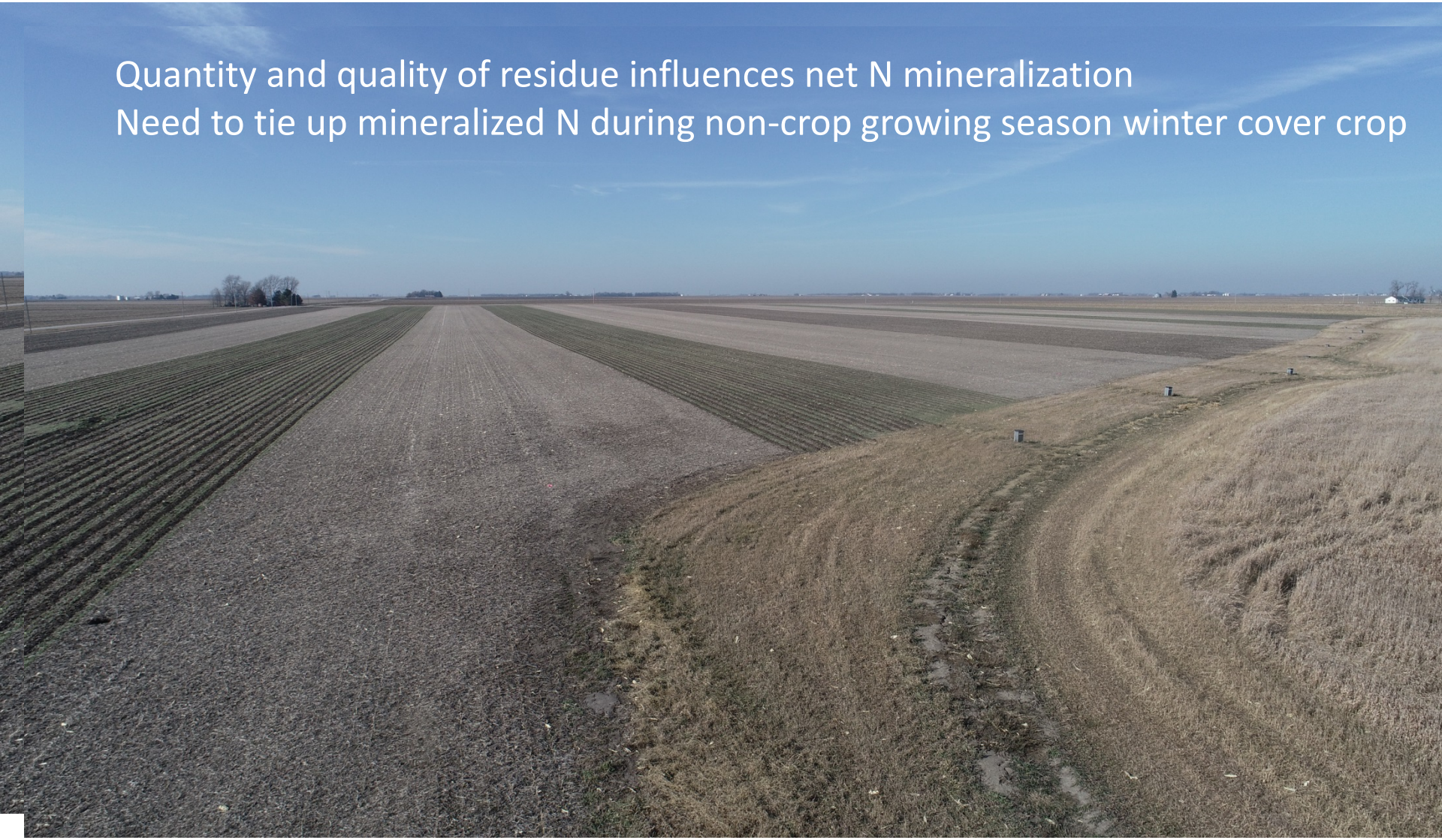
Economics of C-S-W vs. C-S



Strip Tilling Facilitates Nutrient Placement, Reduces Losses, Preserves Soil and Carbon and Enhances Cover Crop Success


SUNFLOWER
SUNFLOWER

Integrating Tillage, Soil Carbon Dynamics and Tile Nitrate Loss


Quantity and quality of residue influences net N mineralization
Need to tie up mineralized N during non-crop growing season winter cover crop

"We're seeing a significant drop in customer complaints since we stopped answering our phones."

Contact Information

Dan Schaefer
IFCA
217-202-5173
dan@ifca.com

Jason Solberg
IFCA
309-212-2159
jason@ifca.com