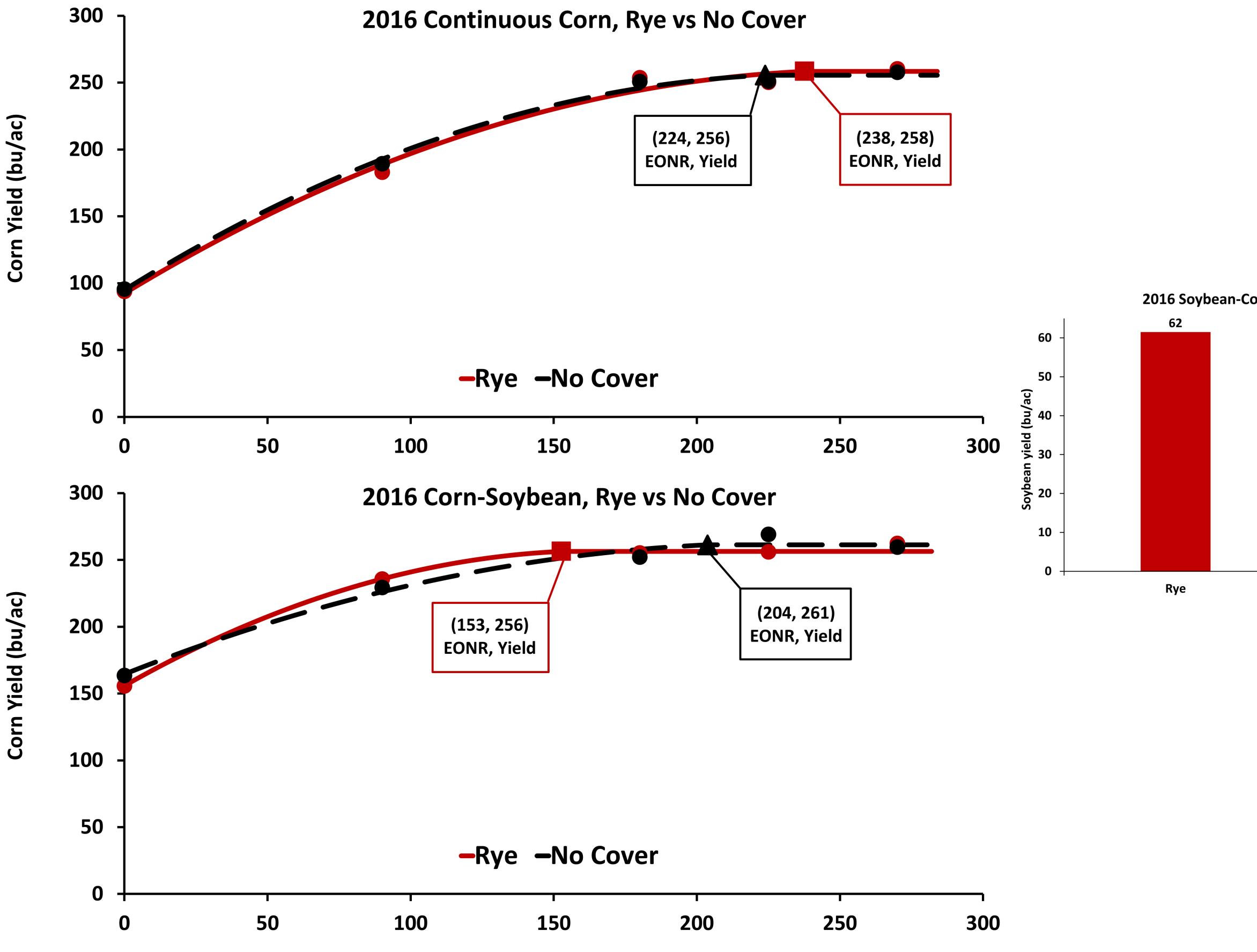
Rosholt Farm Research Update: Nitrogen Management for Corn Production and Water Quality

Fabián G. Fernández fabiangf@umn.edu **Nutrient Management & Water Quality Specialist Natalie Ricks Graduate Student Department of Soil, Water, and Climate**

Rosholt Farm Field Day 17 Aug. 2017, Westport, MN

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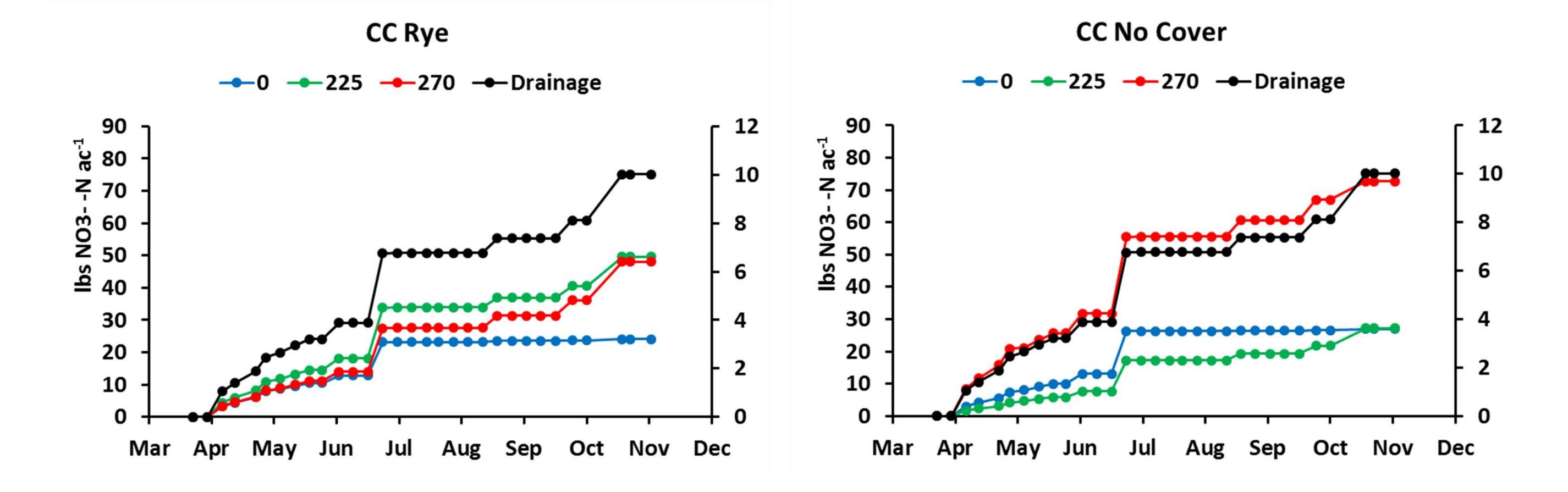


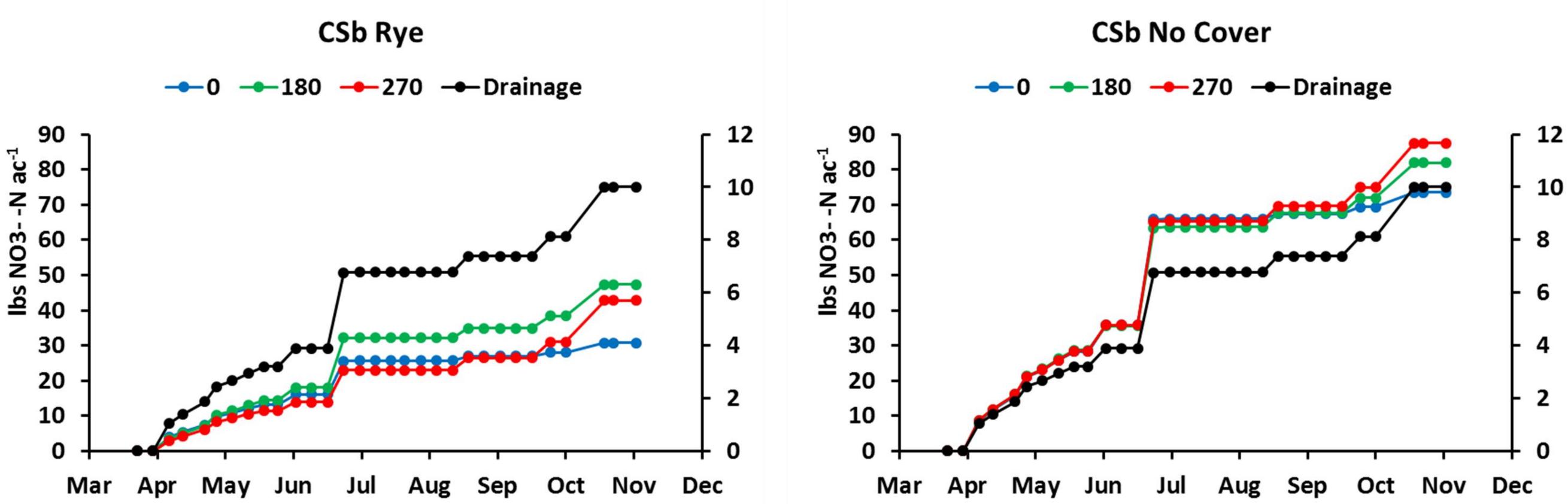
N Rate (lbs N/ac)

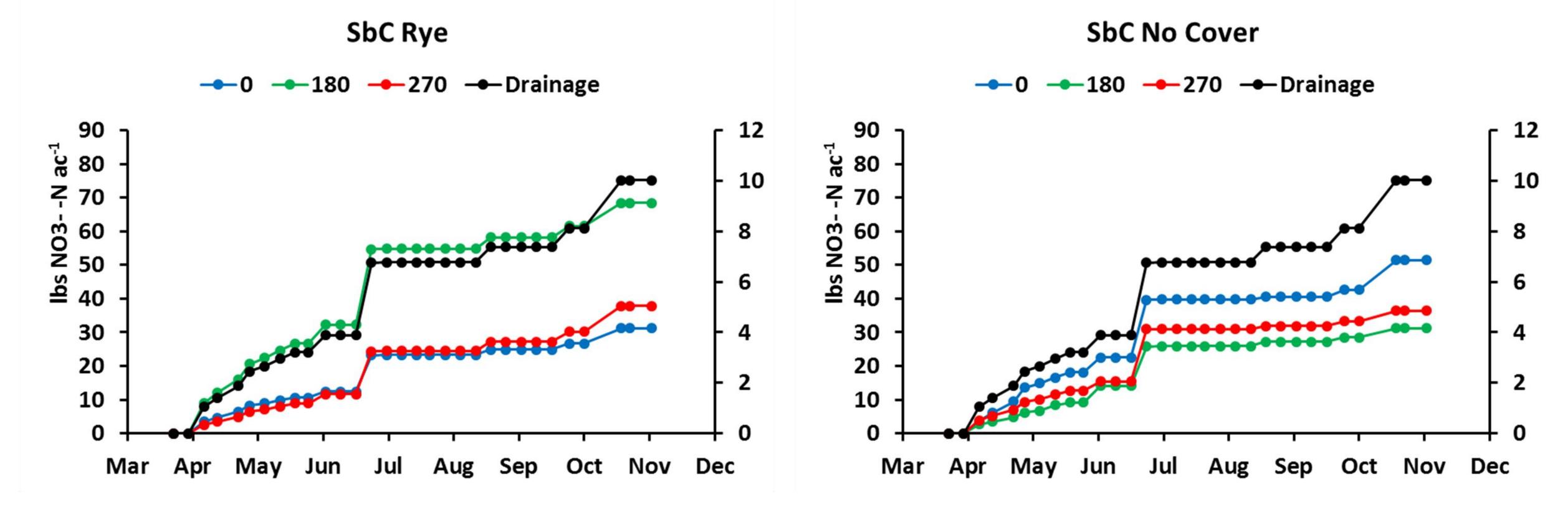
2016 Soybean-Corn, Rye vs No Cover



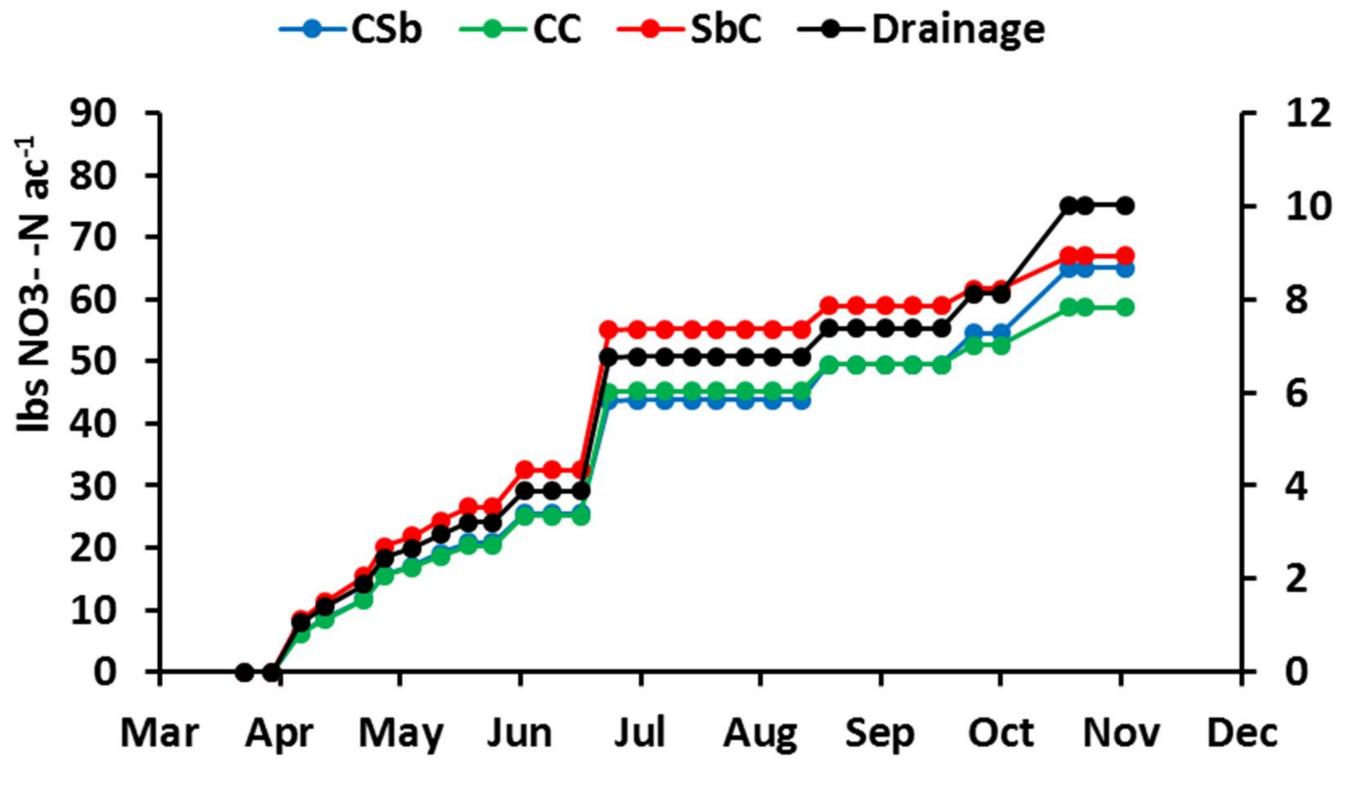
No Cover





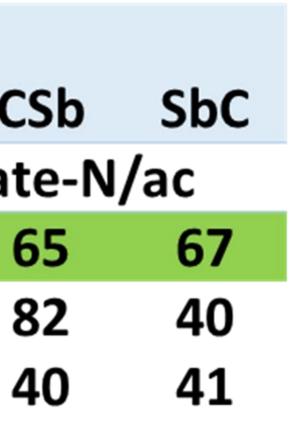


Kura



May-Jun Drainage 28%

May-Jun Lo	bad	
29% rye		
33% no cov	ver	
32% Kura		
Cumulative		
season-long	CC	CSb
	lb ni	trate-
Kura	59	65
NoCover	42	82
Rye	41	40







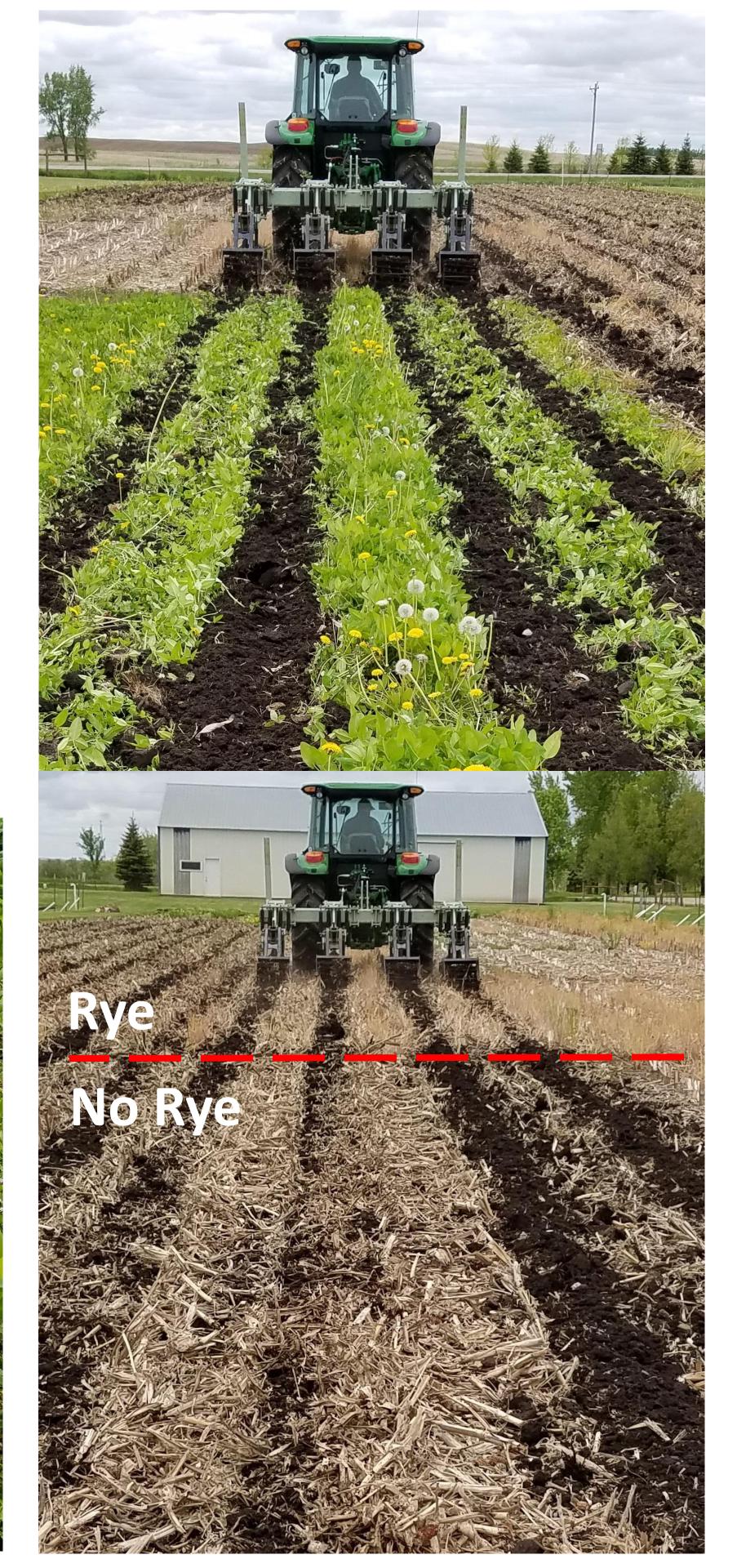
Top Left to Right: Varying CC spring Rye establishment, CSB Rye establishment, Strip tillage of kura (1tRIPr)

Bottom Left to Right:

Development difference on July 14th, strip tillage of rye and no rye treatments



CSB Kura 180 lbs N/ac CSB Kura 0 lbs N/ac Plot 805 Plot 805



Rye in SbC Sept 16 Rye in CC Sept 16

Kura with oat companion crop June 16

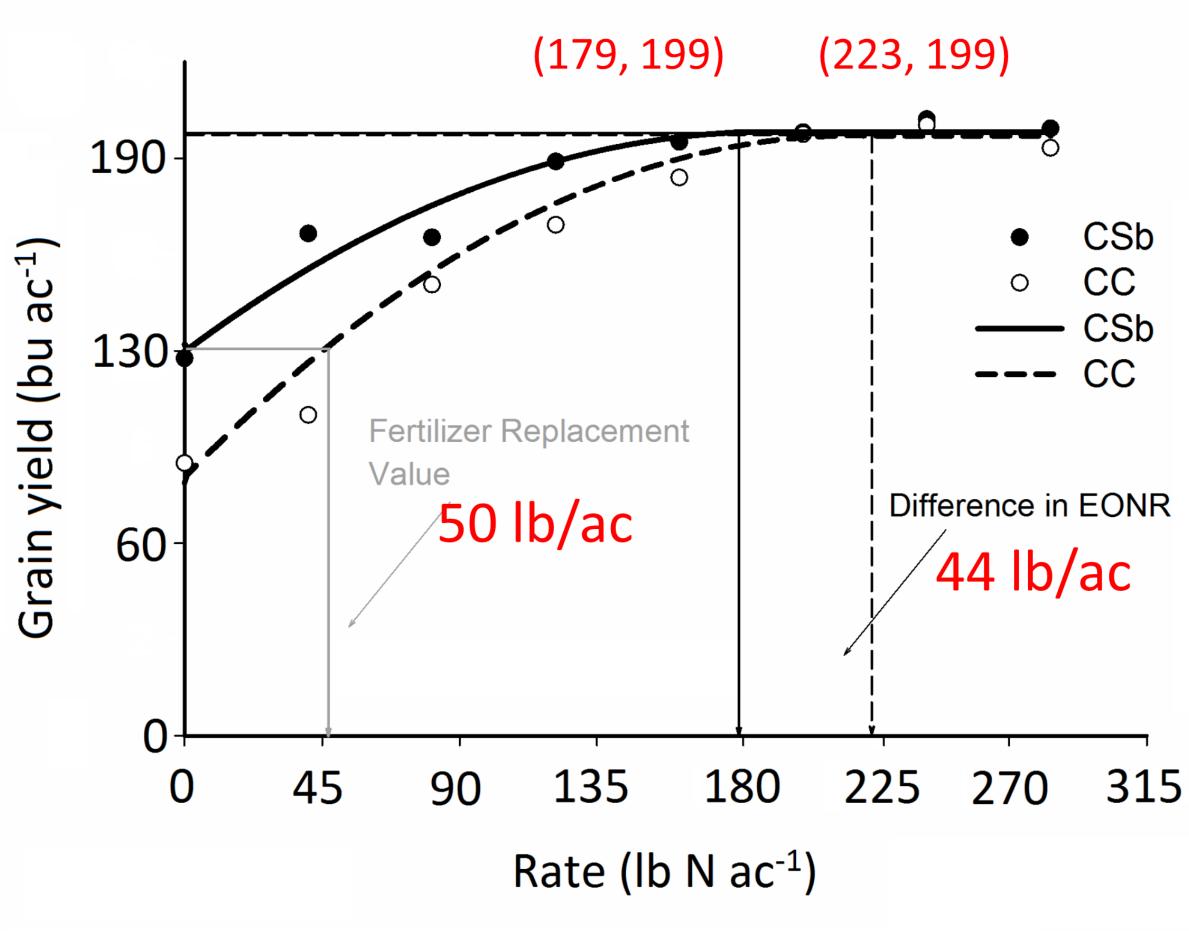
Kura Sept 16



Kura Establishment







2015

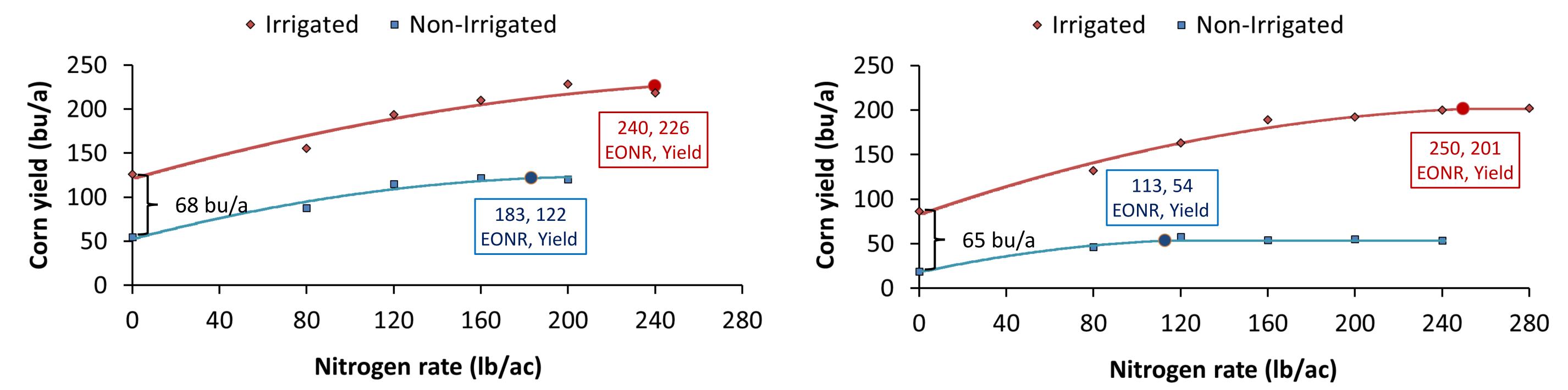


Table 1. Guidelines for use of N fertilizer for corn after corn grown on irrigated sandy soils.				
N price/Crop	MRTN	Acceptable range		
value ratio	lb N/acre			
0.05	233	214 – 252		
0.10	209	192 – 225		
0.15	191	177 – 206		
0.20	177	164 - 190		



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AG-NM-1501 (2015)

Fertilizing Corn Grown on Irrigated Sandy Soils

John A. Lamb, Nutrient Management Specialist Carl J. Rosen, Nutrient Management Specialist Phyllis M. Bongard, Educational Content Develop Daniel E. Kaiser, Nutrient Management Specialist Fabian G. Fernandez, Nutrient Management Specialis

Most irrigated corn grown in Minnesota is on soils derived from sand and gravel outwash deposits. Sub-soils are sandy while the surface soil's textures can range from sand to silty clay loam. With irrigation, these soils are very productive but nutrient application is necessary to get the most economical production from them. These soils also require high levels of management to control nutrient loss and related environmental degradation and profitability concerns.

Brian L. Barber, Director, Soil Testing Laboratory

NITROGEN BEST MANAGEMENT PRACTICES

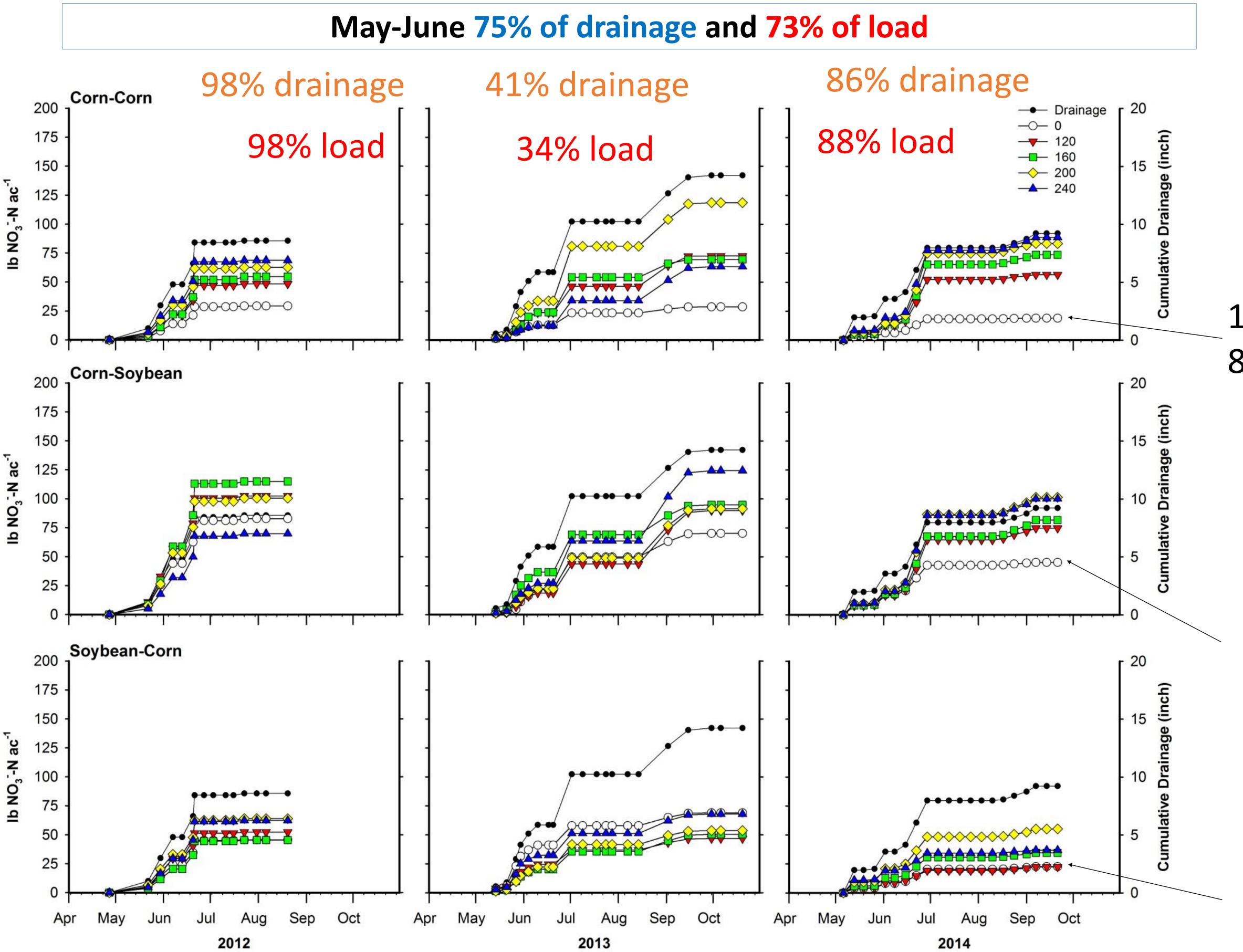
Currently, the use of best management practices (BMPs) for nitrogen (N) is voluntary. Corn growers on irrigated sandy soils should implement BMPs to optimize N use efficiency, profit, and protect against increased losses of nitrate-N to groundwater aquifers. The focus of this publication is to present recent findings for N fertilizer use, especially related to rate of application and time of application. For more detailed discussion on time of application, selection

of N source, placement of fertilizer N, and decisions regarding the use of nitrification inhibitors please see Extension publications listed under Related Publications. **Rate of N Application**

Because of environmental risks and profitability concerns, N is the most

important nutrient input for irrigated corn The corn fertilizer guidelines established in 2006 were based on the use of the Maximum Return To Nitrogen (MRTN) concept. This concept incorporates the productivity of the soil the cost of N fertilizer, the price received for corn, and the grower's attitude towards risk associated with insufficient N for the crop and risk of environmental degradation.

When the MRTN concept was developed, there was relatively little current information for corn N response on irrigated sandy soils. A decision was made to use data from highly productive fine-textured soils for the irrigated sandy soils until an adequate amount of data was collected under irrigation. Here we discuss N rates based on field research conducted since 2007 on irrigated sandy soils. The corn market and fertilizer costs do affect the economic optimum N rate. To account for this, the ratio of the price of N fertilizer per pound to the value of a bushel of corn is used in the N rate decision. An example calculation of the price/value ratio is if N fertilizer costs \$0.50 per lb N or \$830 per ton of anhydrous ammonia, and corn is valued at \$5.00 per bushel, the ratio would be 0.50/5.00 = 0.10Once the soil productivity, in this case irrigated sandy soils, and price/value ratio have been determined, a producer's attitude towards risk must be factored into the

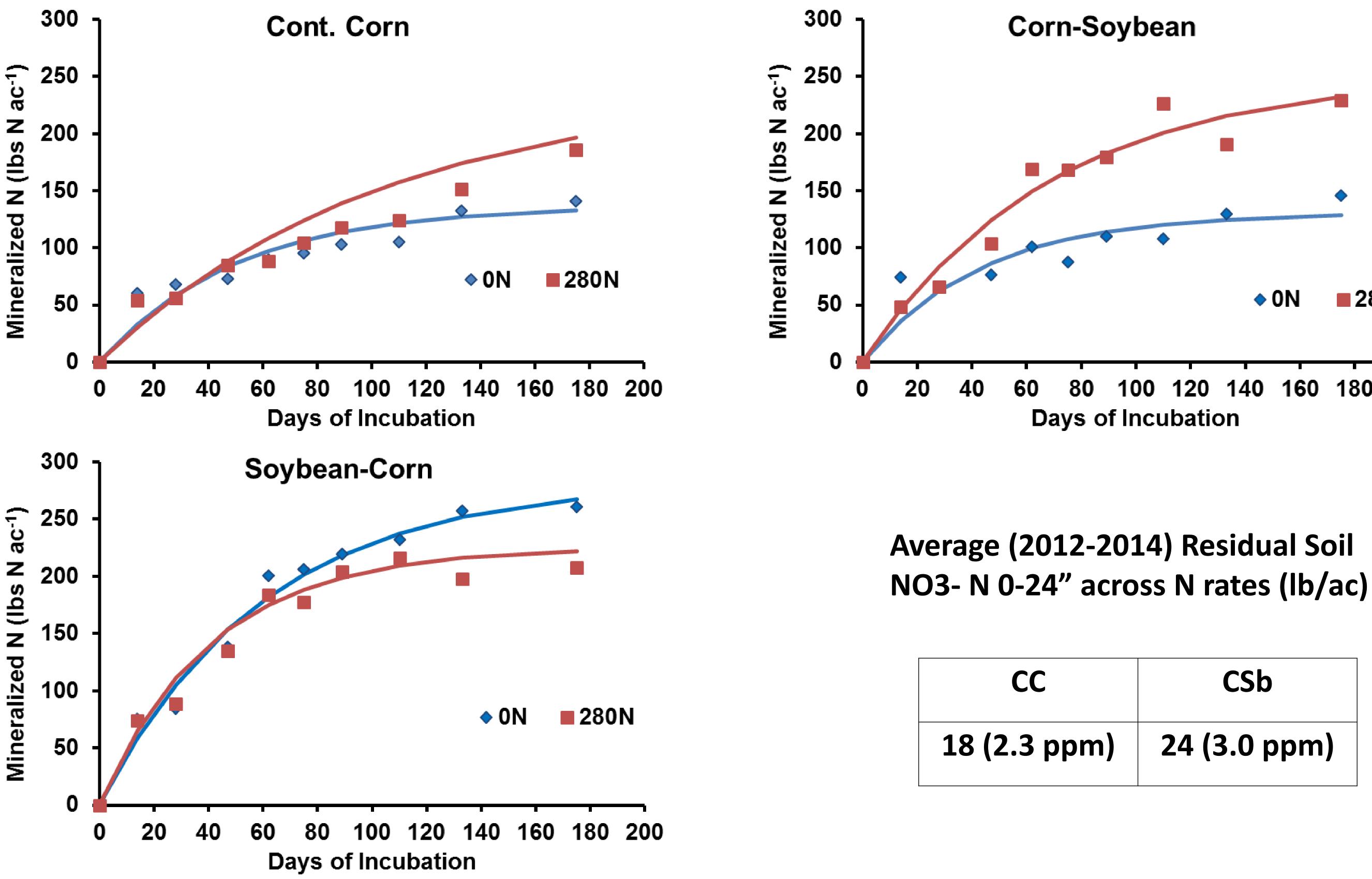


19 lb/a 8.8 ppm

45 lb/a 19.7 ppm

23 lb/a 10.6 ppm

Arvilla sandy loam: 4.6% OM CEC 16.1 meq/100g, (70% sand, 17% silt, 13% Clay), pH 7.1



CC	(
18 (2.3 ppm)	24 (3.

CSb .0 ppm)

180 160 200 140



	CC			CSb		
	N rate	Grain yield	NO ₃ ⁻ -N Leached	N rate	Grain yield	
	Ib ac ⁻¹	bu ac ⁻¹	Ib ac ⁻¹	Ib ac ⁻¹	bu ac ⁻¹	
EONR	223	199	77	179	199	
20% Reduction	179	191	70	144	194	
25% Reduction	167	188	68	135	193	

20% reduction reduced yield by 4% and NO₃-N leaching by 9%. **25% reduction reduced yield by 6% and NO₃-N leaching by 11%**

Product	Yield	СС	CSb	SbC	СС	CSb	SbC
160 lb/ac	bu ac ⁻¹	mg NO ₃ N L-1		lb NO ₃ ⁻ -N ac ⁻¹			
Urea	198 <mark>a</mark>	30 a	44 a	19 a	63 a	95a	43 a
ESN	190b	27 a	42 a	19 a	64 a	85 a	47 a
ESN/Urea	188b	28 a	46 a	22 a	60 a	99 a	46 a
SuperU	185b	33 a	52 a	21 a	67 a	104 a	52 a

