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

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Rosholt Farm Field Day
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UNIVERSITY OF MINNESOTA
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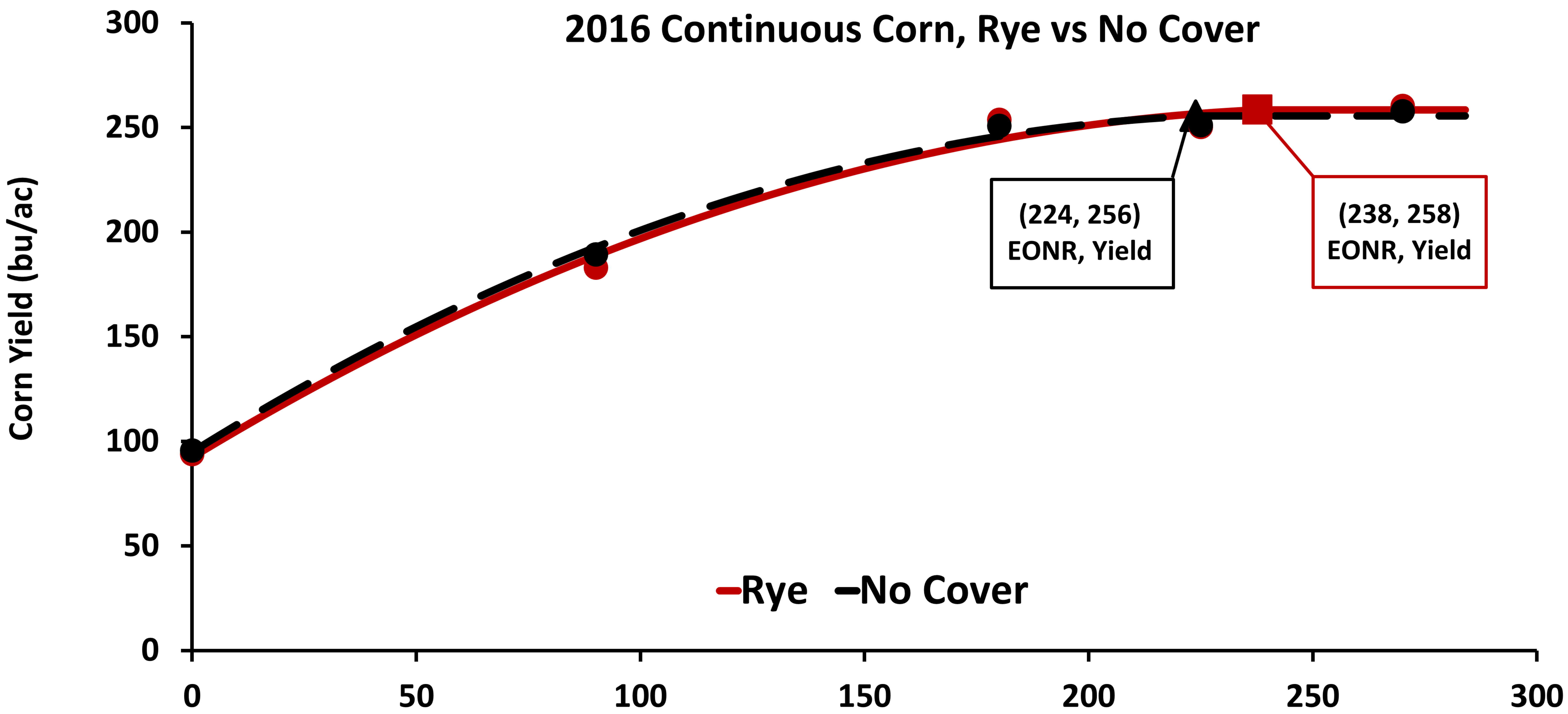
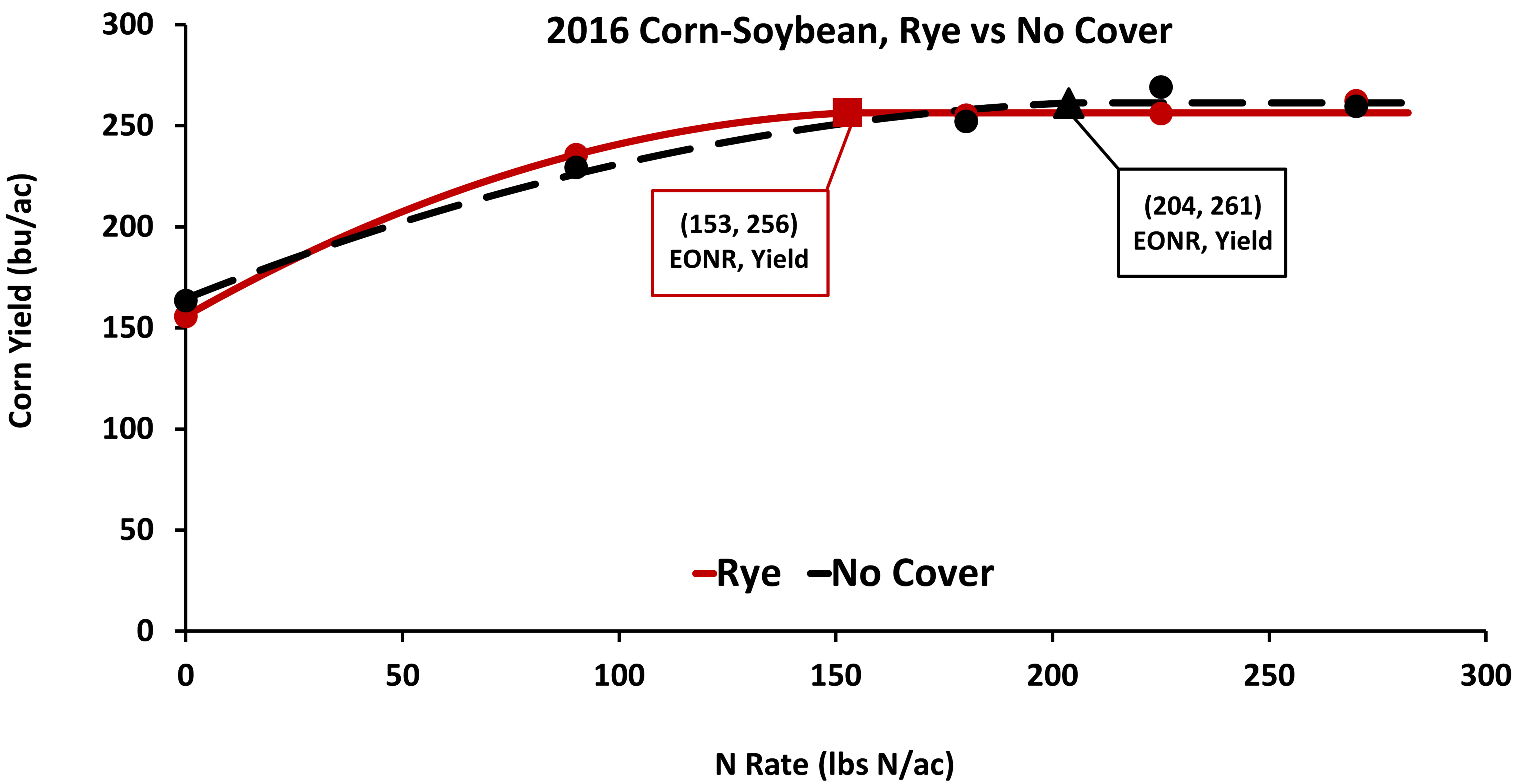
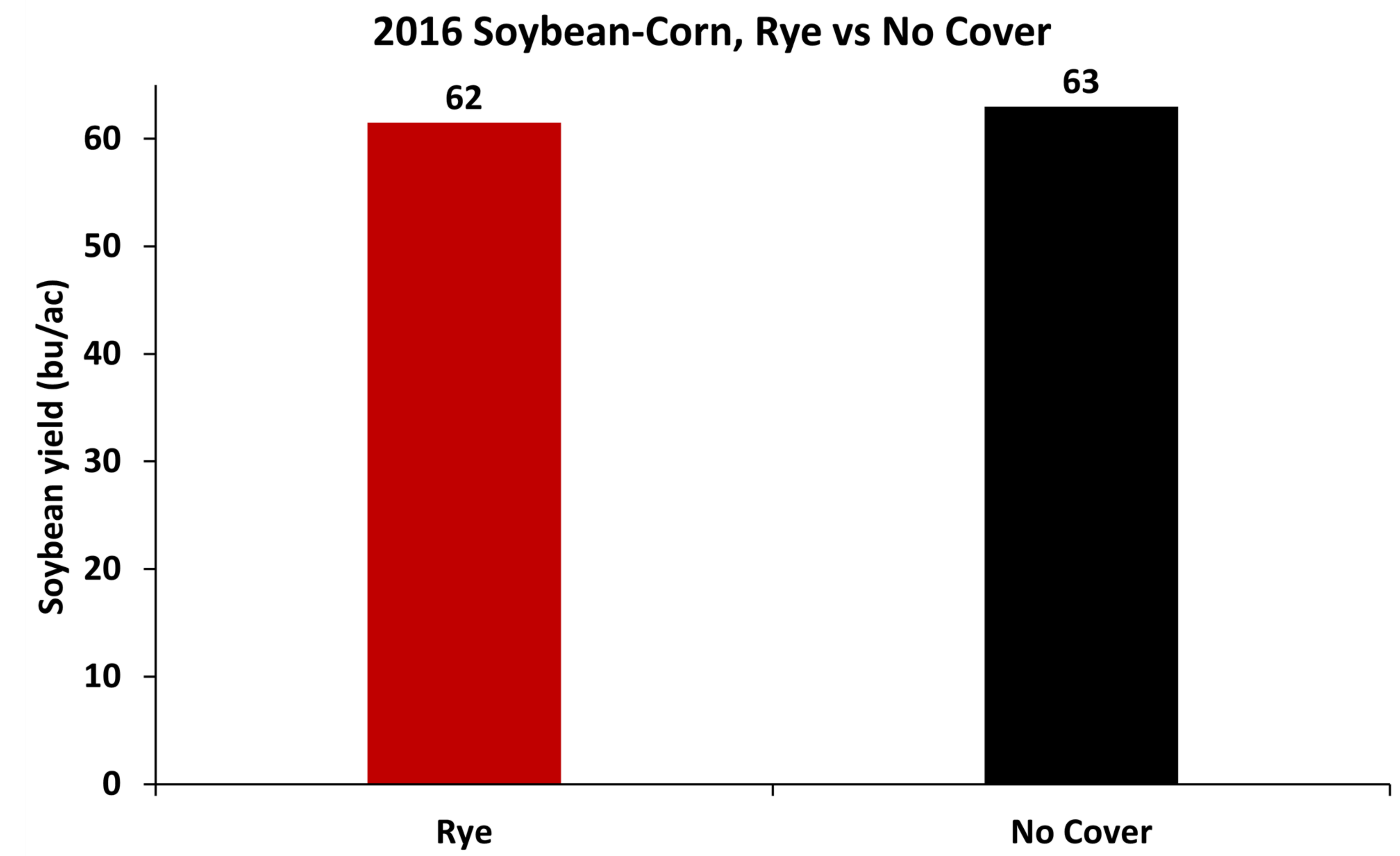
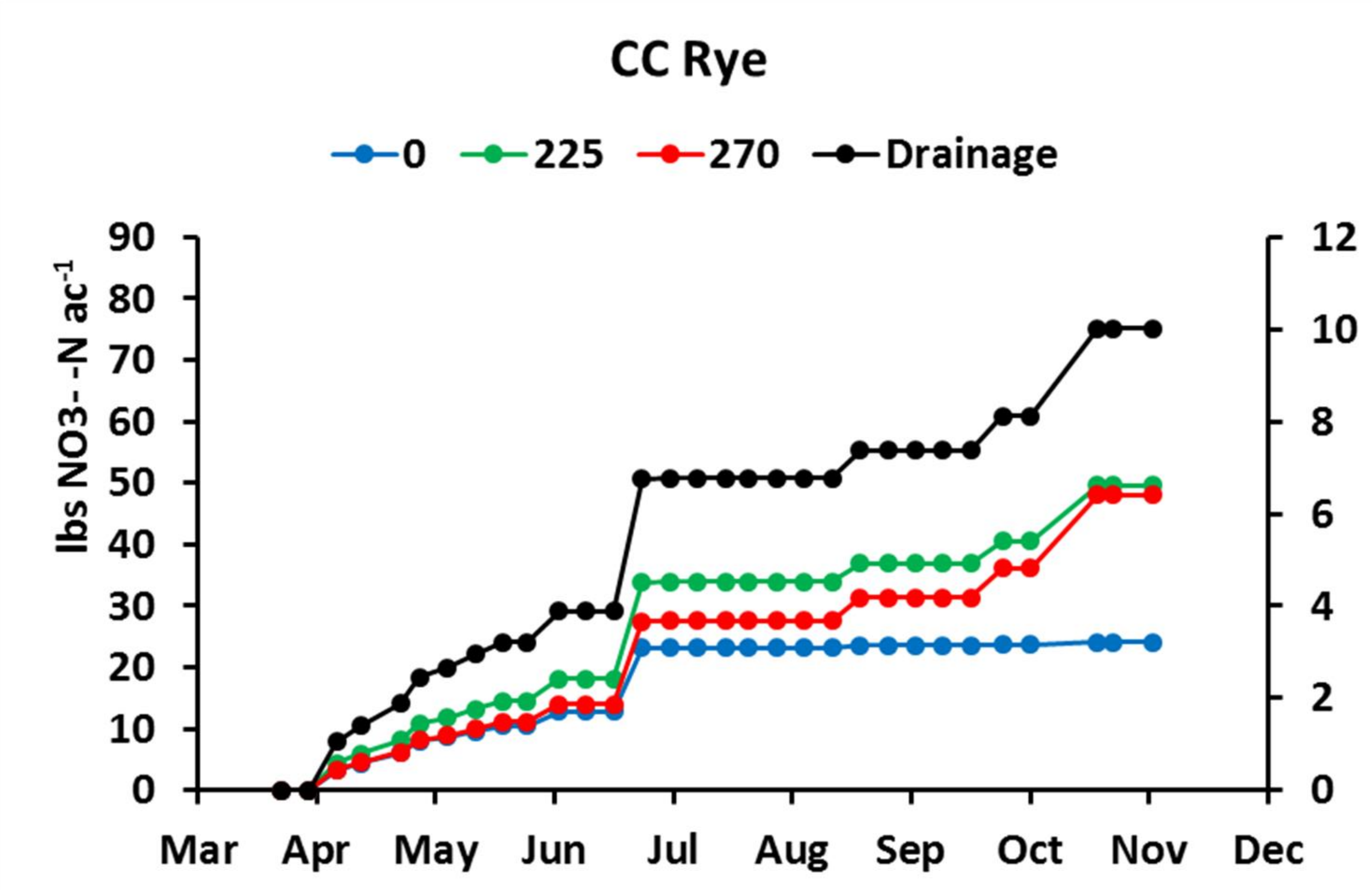
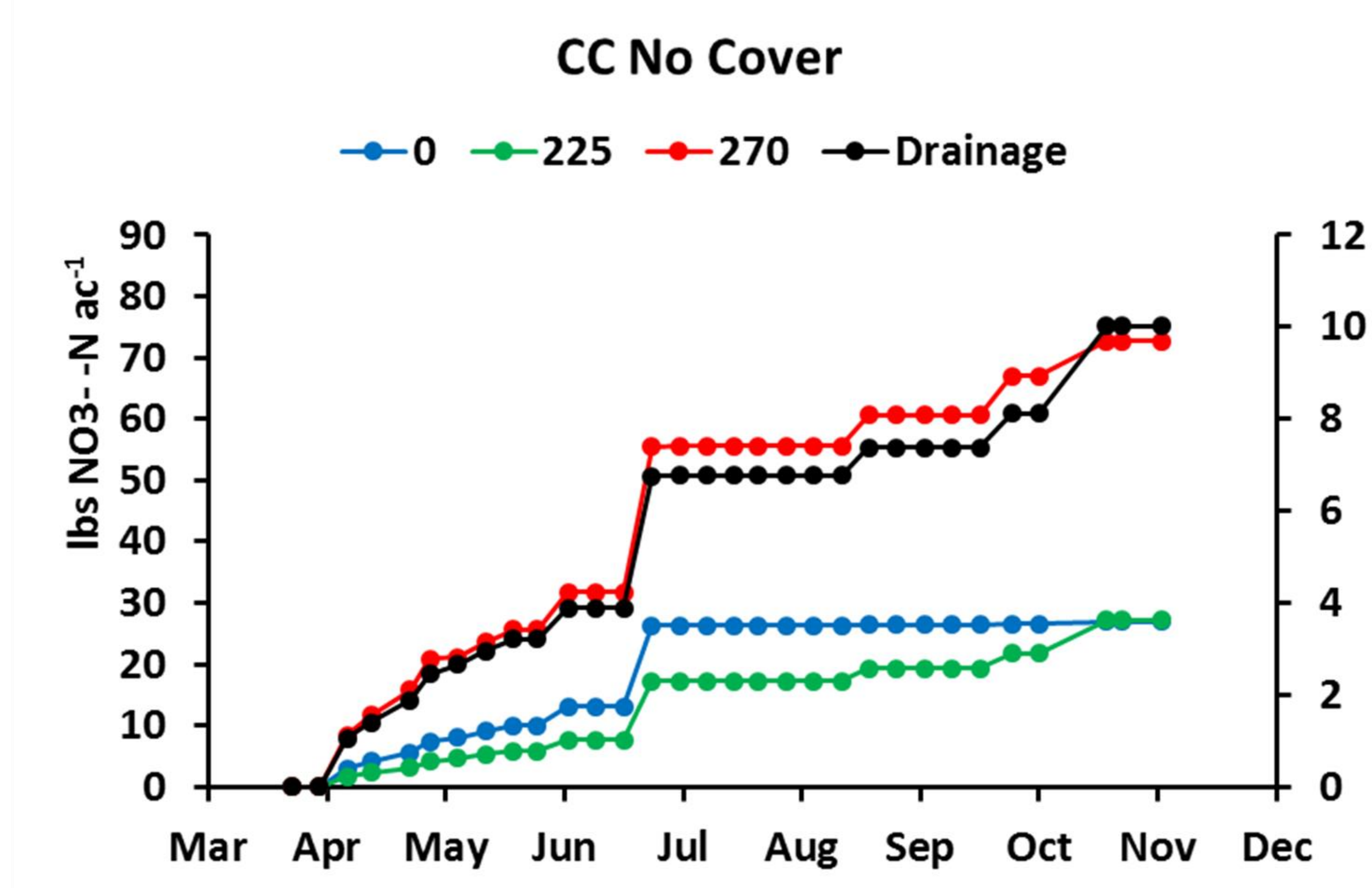

2016 Continuous Corn, Rye vs No Cover
Corn Yield (bu/ac)
300
250
200
150
100
50
0
0
50
100
150
200
250
300
(224, 256)
EONR, Yield
(238, 258)
EONR, Yield
Rye
No Cover


2016 Corn-Soybean, Rye vs No Cover
Corn Yield (bu/ac)
300
250
200
150
100
50
0
0
50
100
150
200
250
300
(153, 256)
EONR, Yield
(204, 261)
EONR, Yield
Rye
No Cover
N Rate (lbs N/ac)


2016 Soybean-Corn, Rye vs No Cover
Soybean yield (bu/ac)
60
50
40
30
20
10
0
62
63
Rye
No Cover


CC Rye
0
225
270
Drainage
lbs NO3- -N ac-1
0
10
20
30
40
50
60
70
80
90
0
2
4
6
8
10
12
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


CC No Cover
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225
270
Drainage
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0
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30
40
50
60
70
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0
2
4
6
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12
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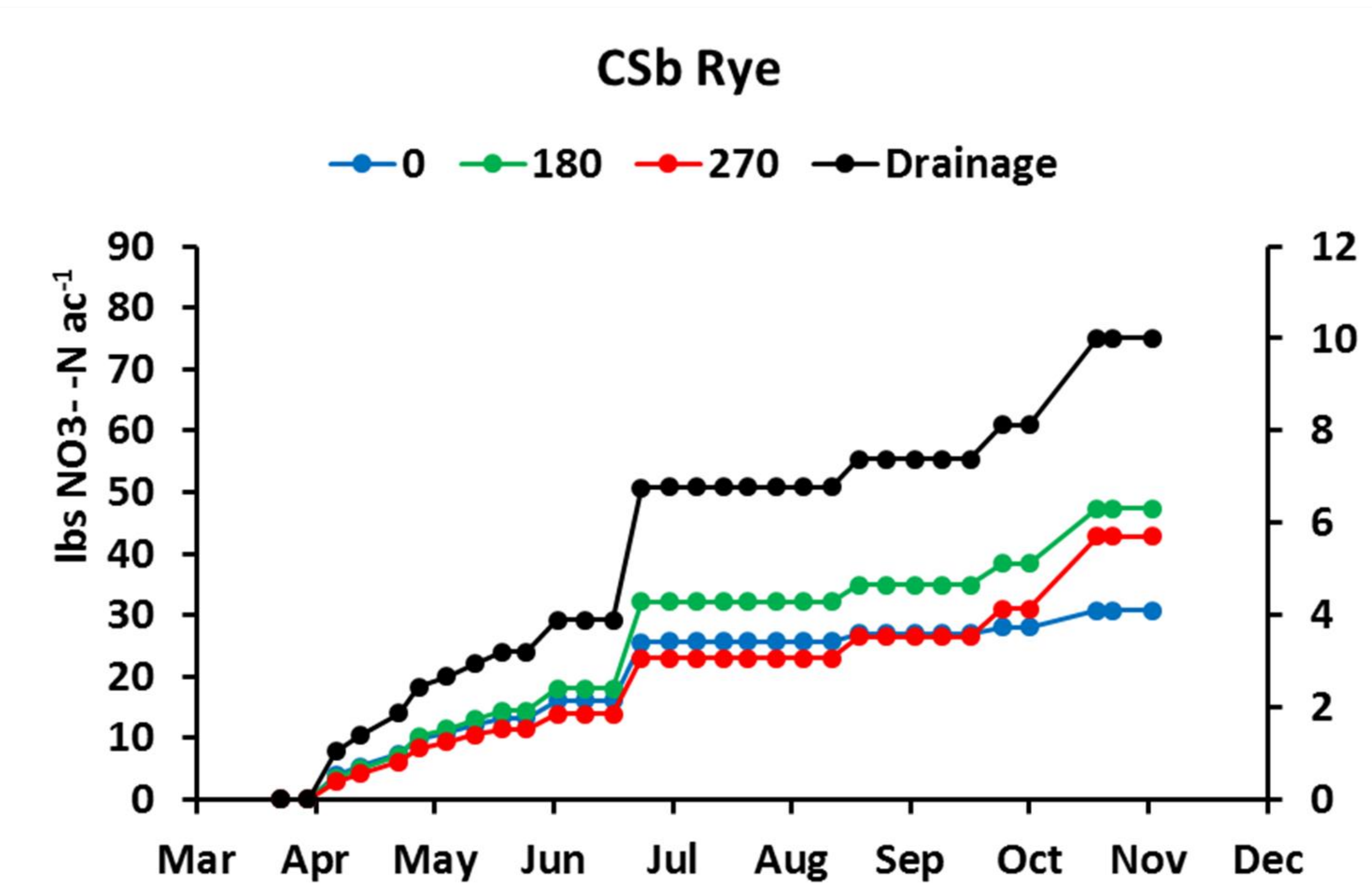
CSb Rye
0
180
270
Drainage
lbs NO3- -N ac-1
0
10
20
30
40
50
60
70
80
90
0
2
4
6
8
10
12
Mar
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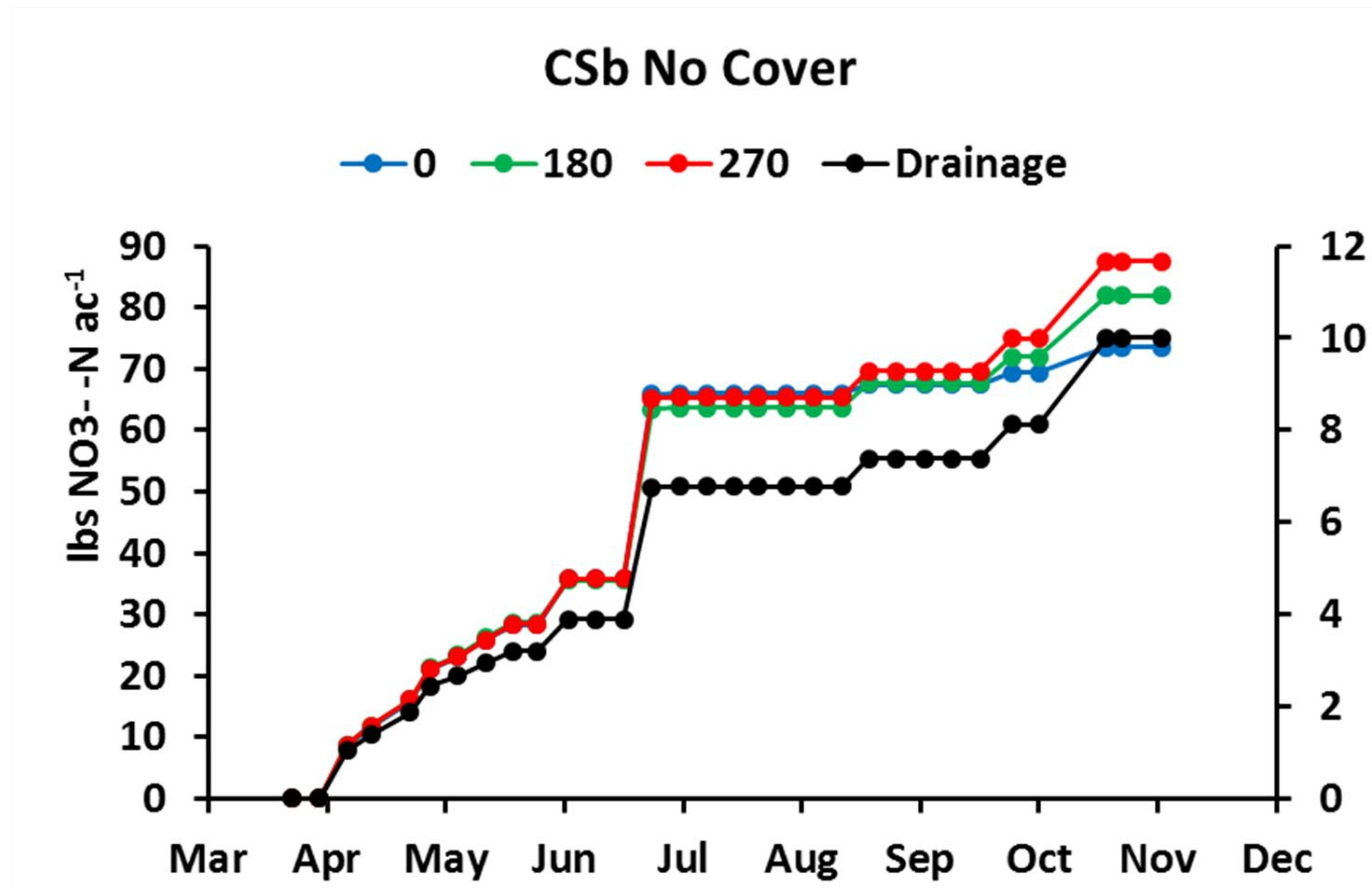
CSb No Cover
0
180
270
Drainage
lbs NO3- -N ac-1
0
10
20
30
40
50
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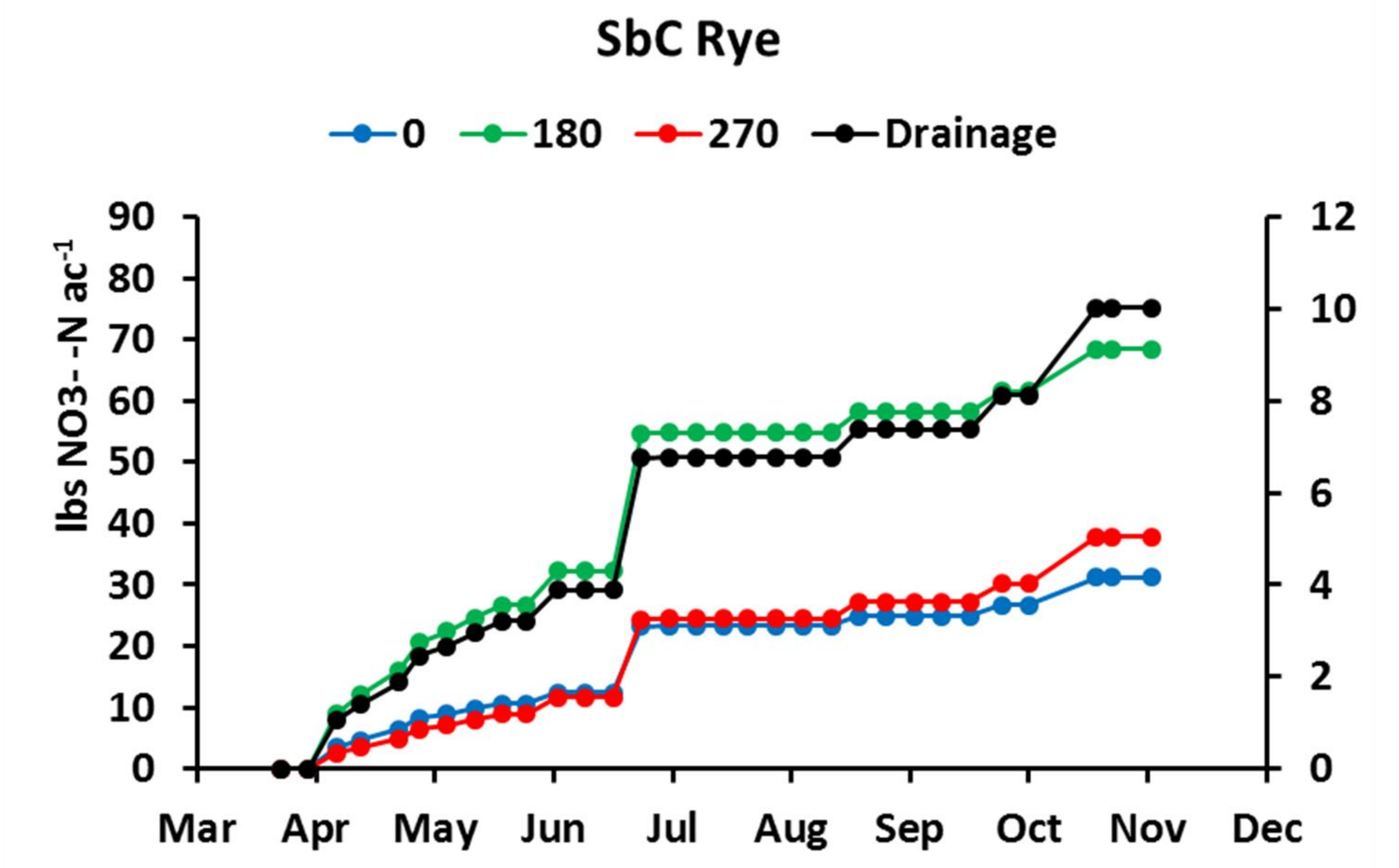
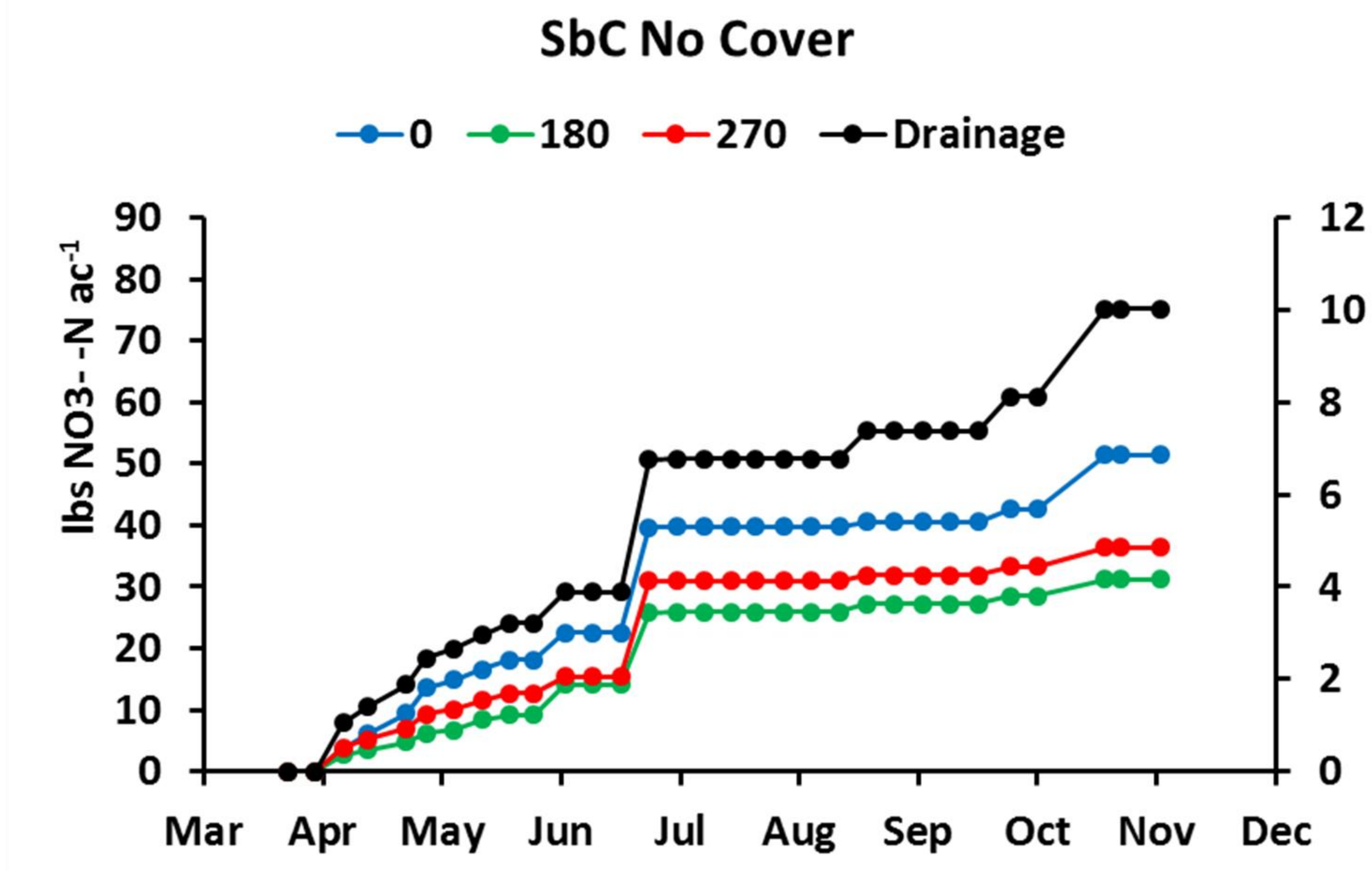
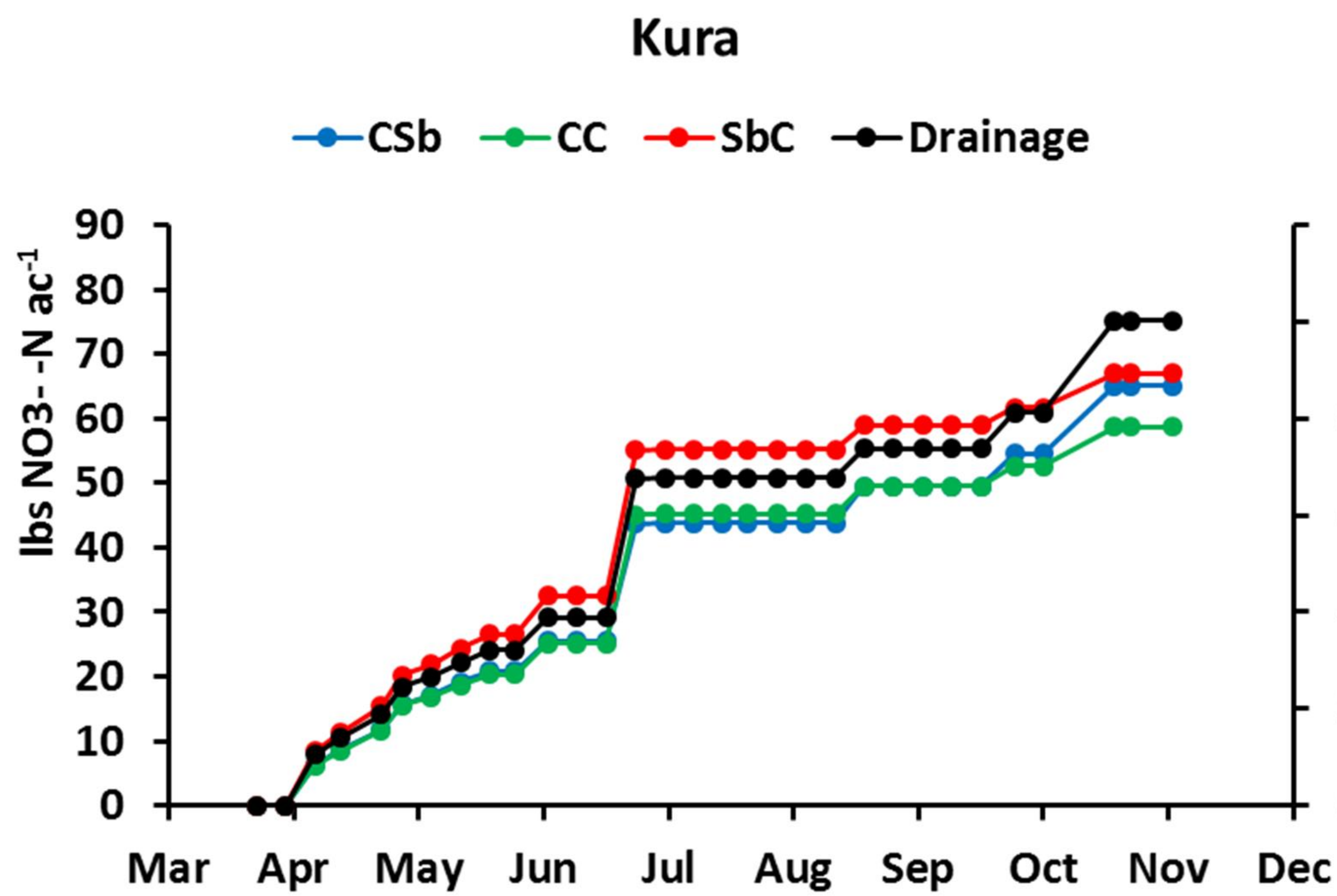






May-Jun Drainage

28%

May-Jun Load

29% rye

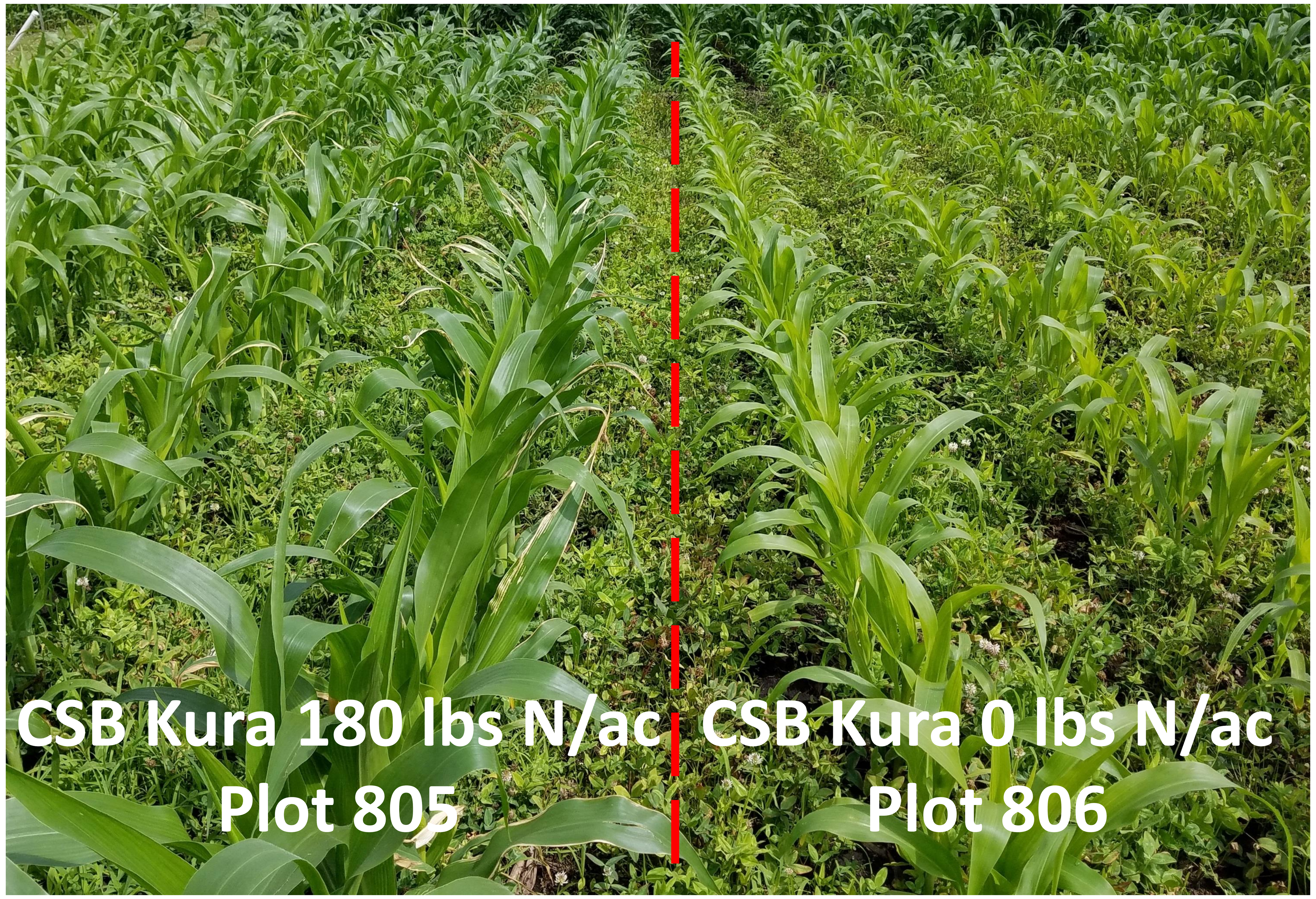
33% no cover

32% Kura

Cumulative season-long	CC	CSb	SbC
	lb nitrate-N/ac		
Kura	59	65	67
NoCover	42	82	40
Rye	41	40	41

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



Rye Establishment
Rye in SbC Sept 16
Rye in CC Sept 16
Rye in CC Oct 16
Rye in SbC Nov 16
Rye at Termination 17
Rye in CC April 16
Kura Establishment
Kura with oat companion crop June 16
Mechanical Kura Suppression 17
Kura Sept 16
Kura Nov 16
Soybeans in Kura 17

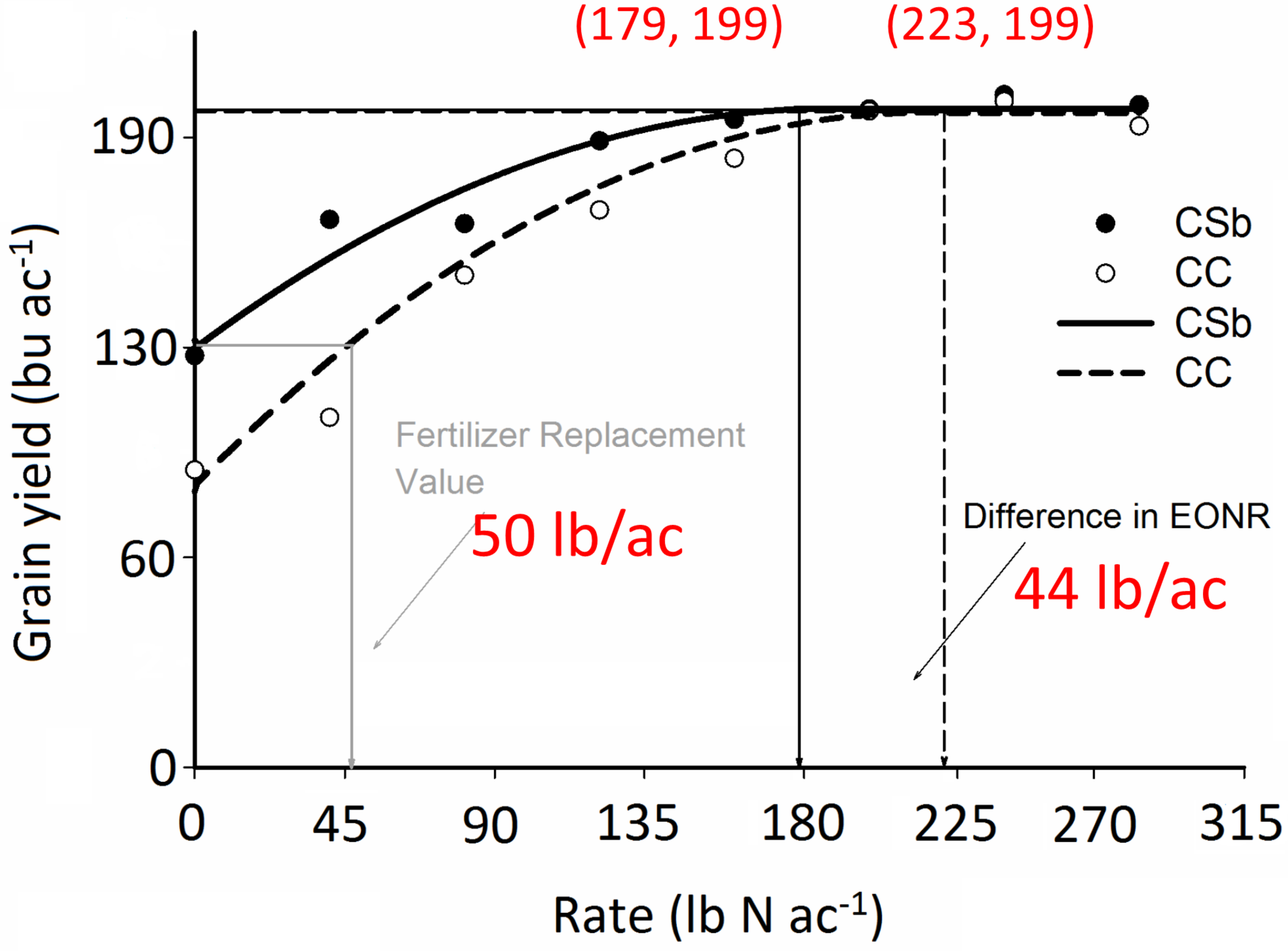
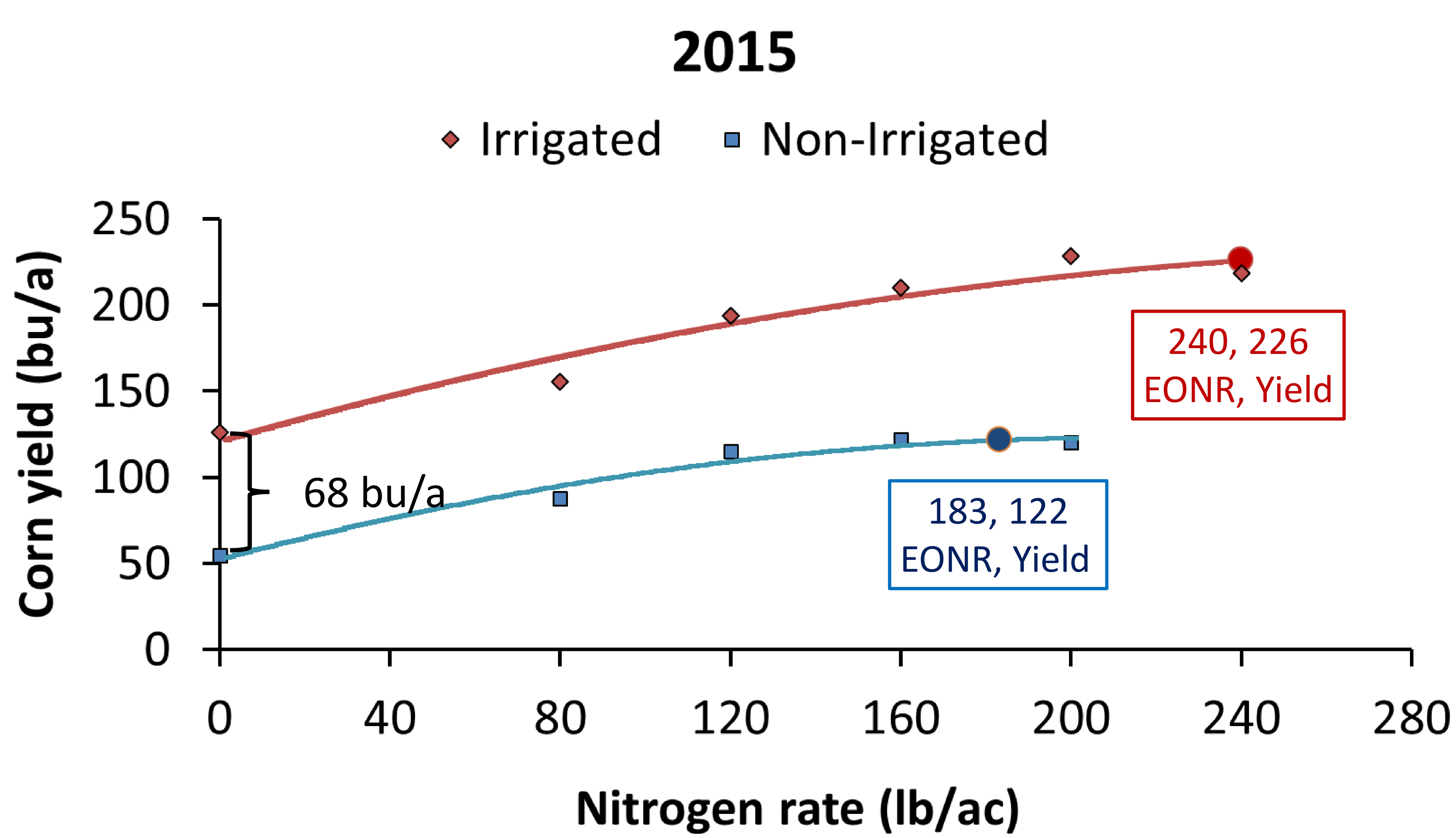
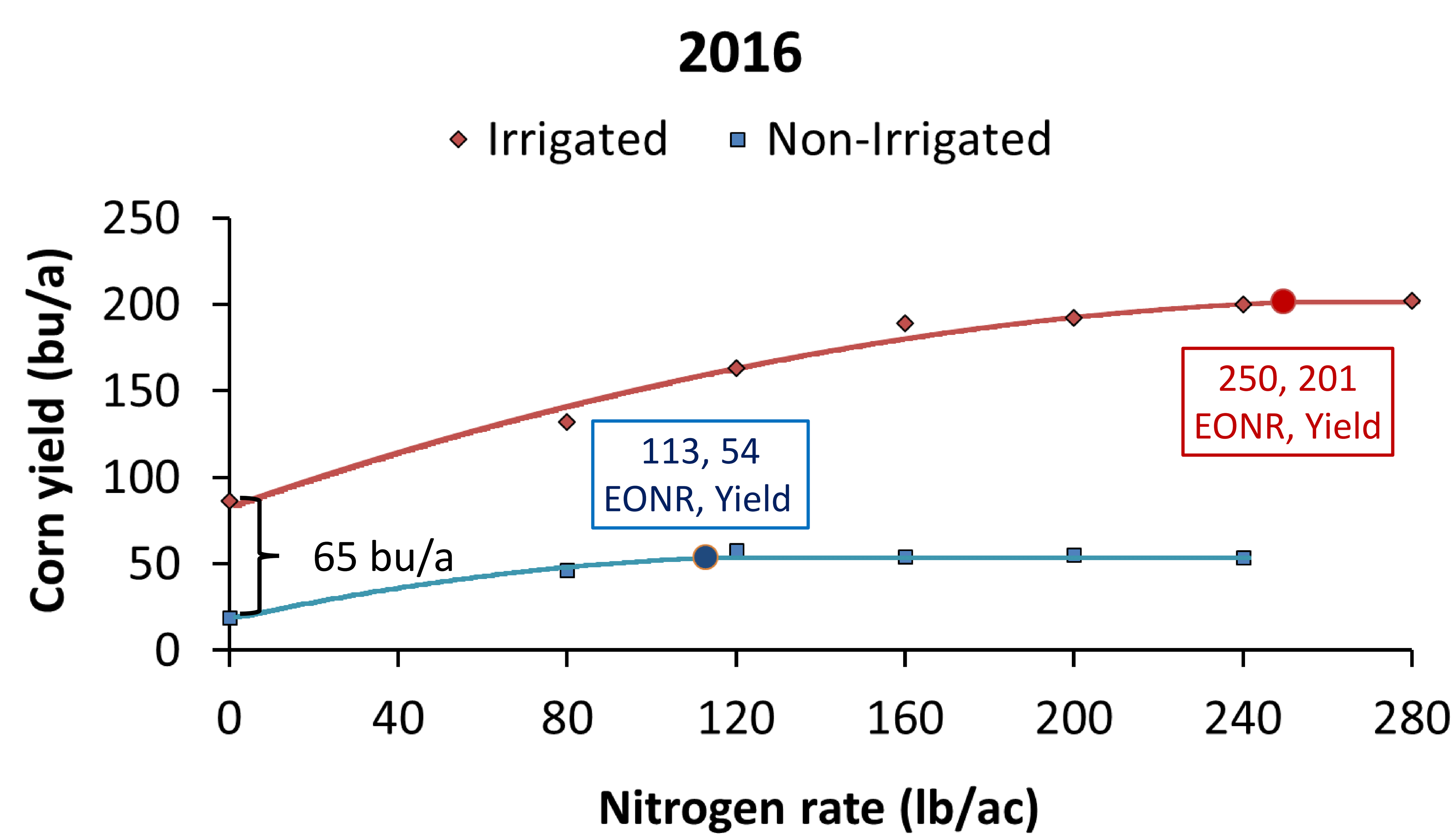


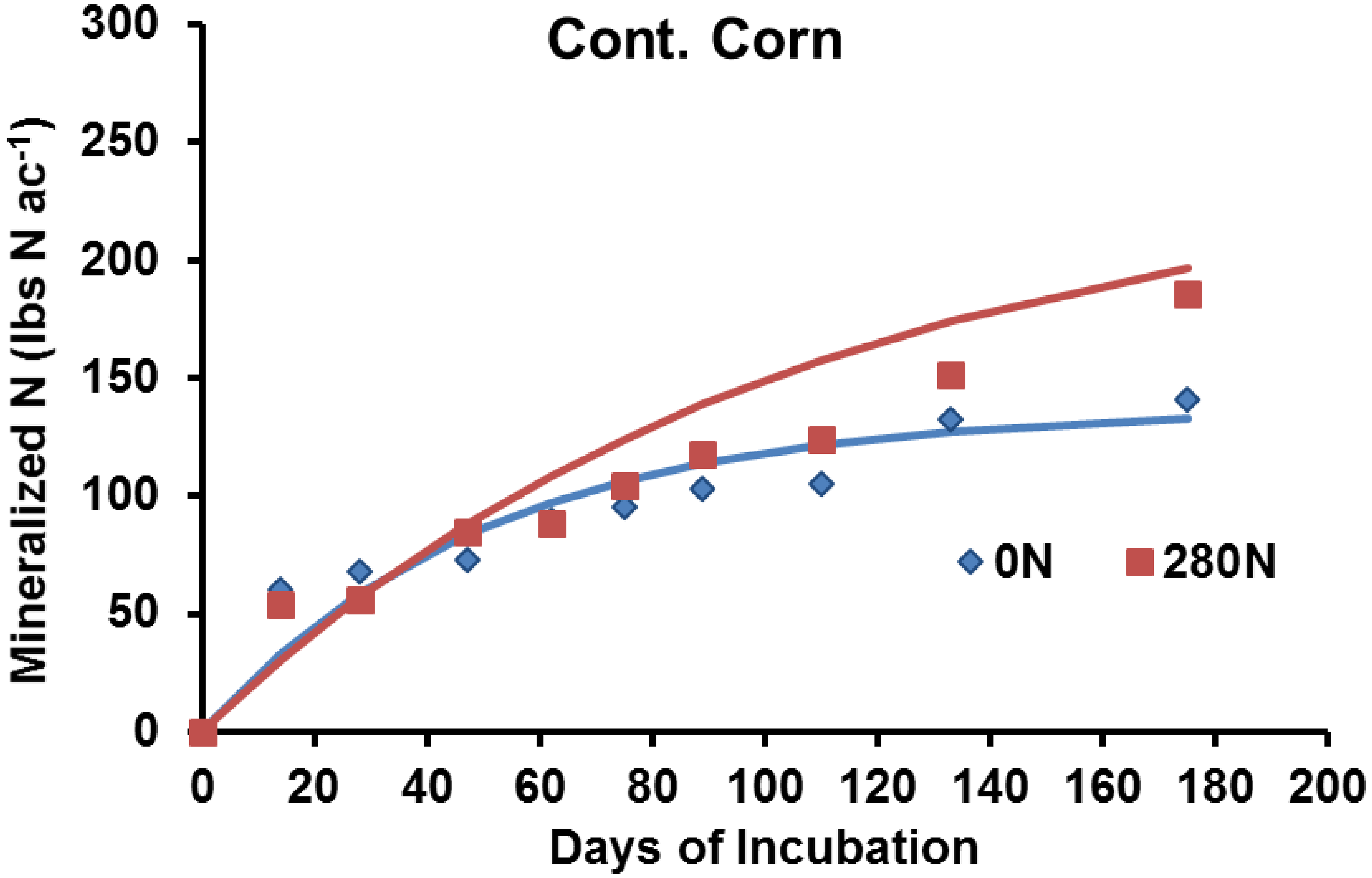
Table 1. Guidelines for use of N fertilizer for corn after corn grown on irrigated sandy soils.		
N price/Crop value ratio	MRTN	Acceptable range
	------------ lb N/acre ------------	
0.05	233	214 – 252
0.10	209	192 – 225
0.15	191	177 – 206
0.20	177	164 - 190

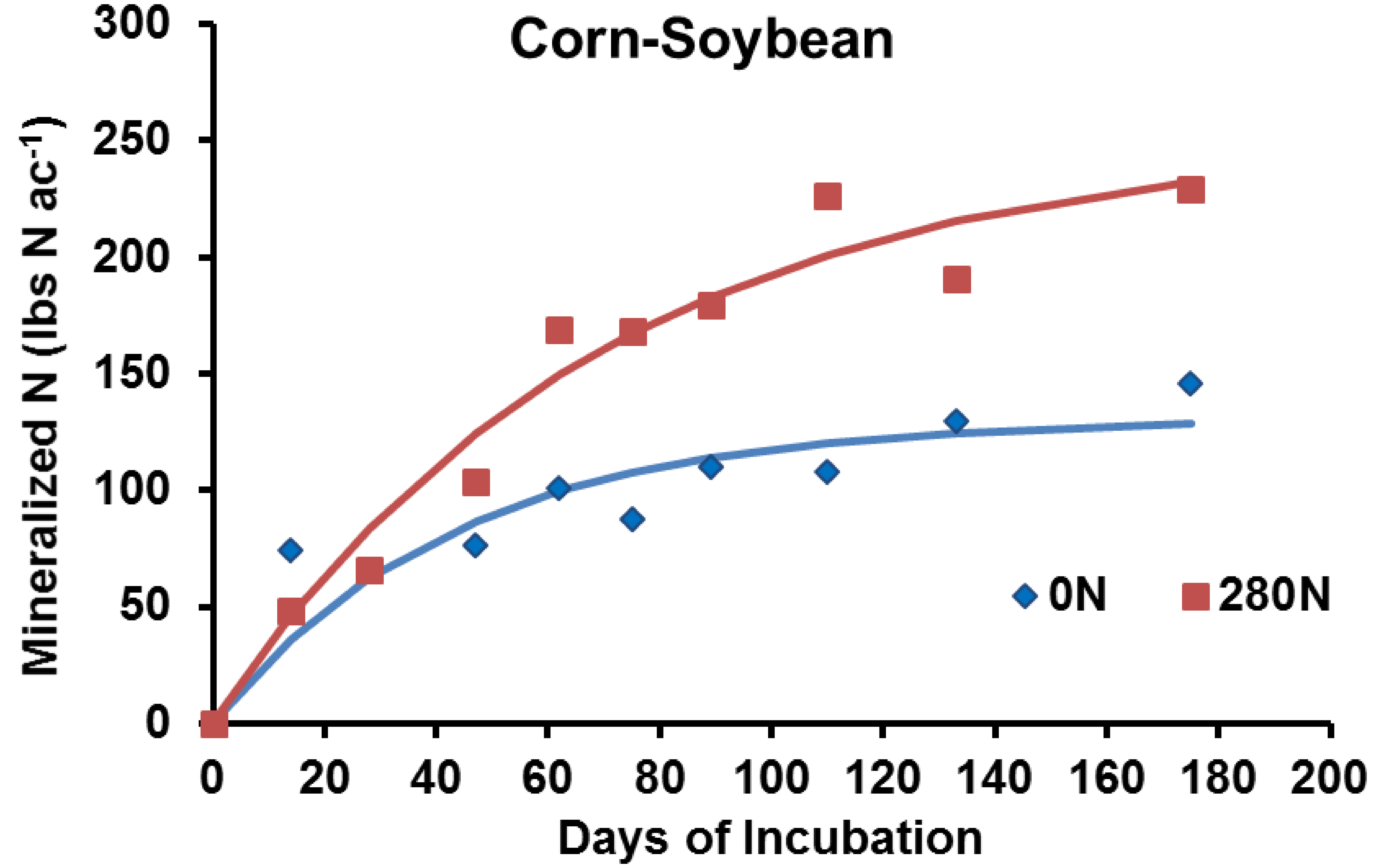


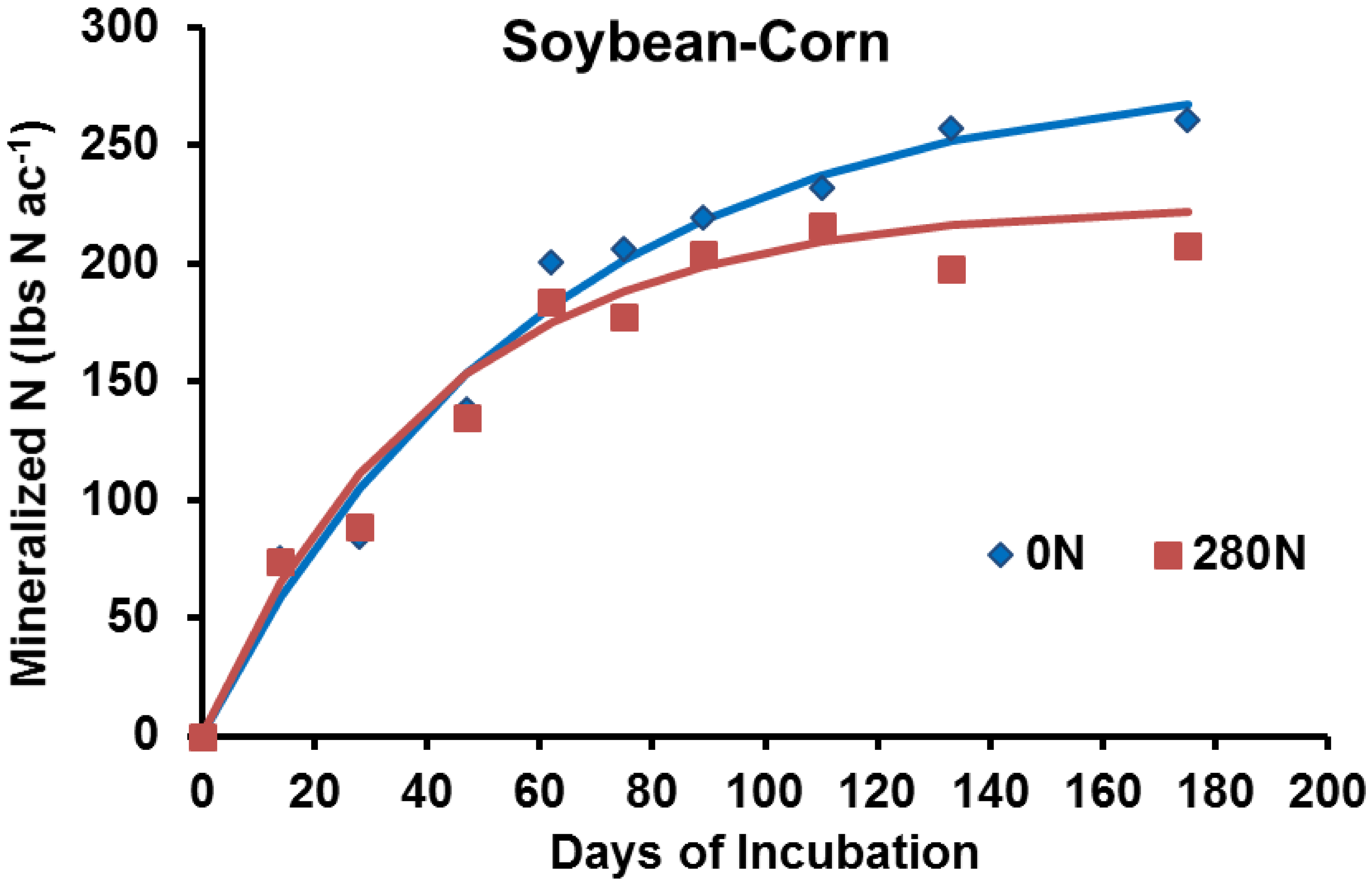


May-June 75% of drainage and 73% of load

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







Average (2012-2014) Residual Soil NO3- N 0-24" across N rates (lb/ac)

CC	CSb
18 (2.3 ppm)	24 (3.0 ppm)

	CC			CSb		
	N rate	Grain yield	NO_3^--N Leached	N rate	Grain yield	NO_3^--N Leached
	lb ac^{-1}	bu ac^{-1}	lb ac^{-1}	lb ac^{-1}	bu ac^{-1}	lb ac^{-1}
EONR	223	199	77	179	199	95
20% Reduction	179	191	70	144	194	91
25% Reduction	167	188	68	135	193	90

20% reduction reduced yield by 4% and NO_3-N leaching by 9%.

25% reduction reduced yield by 6% and NO_3-N leaching by 11%

Product	Yield	CC	CSb	SbC	CC	CSb	SbC
160 lb/ac	bu ac^{-1}	mg NO_3^--N L^{-1}			lb NO_3^--N ac^{-1}		
Urea	198a	30a	44a	19a	63a	95a	43a
ESN	190b	27a	42a	19a	64a	85a	47a
ESN/Urea	188b	28a	46a	22a	60a	99a	46a
SuperU	185b	33a	52a	21a	67a	104a	52a