Nutrient management in *Brassica carinata*

Michael J. Mulvaney

March 30, 2017

NFREC, Quincy, FL

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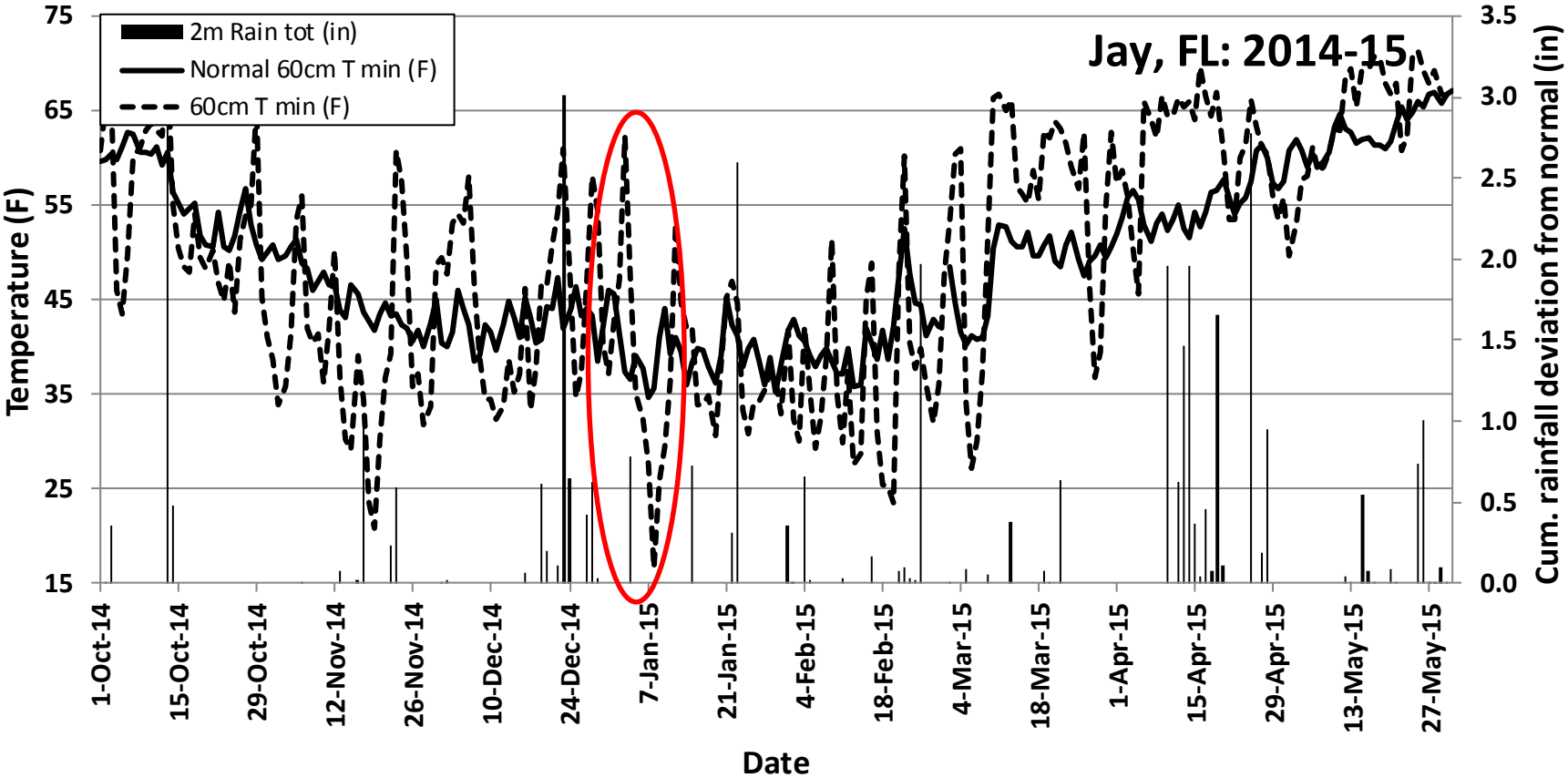
Jay 2014-15 season: Min. temps



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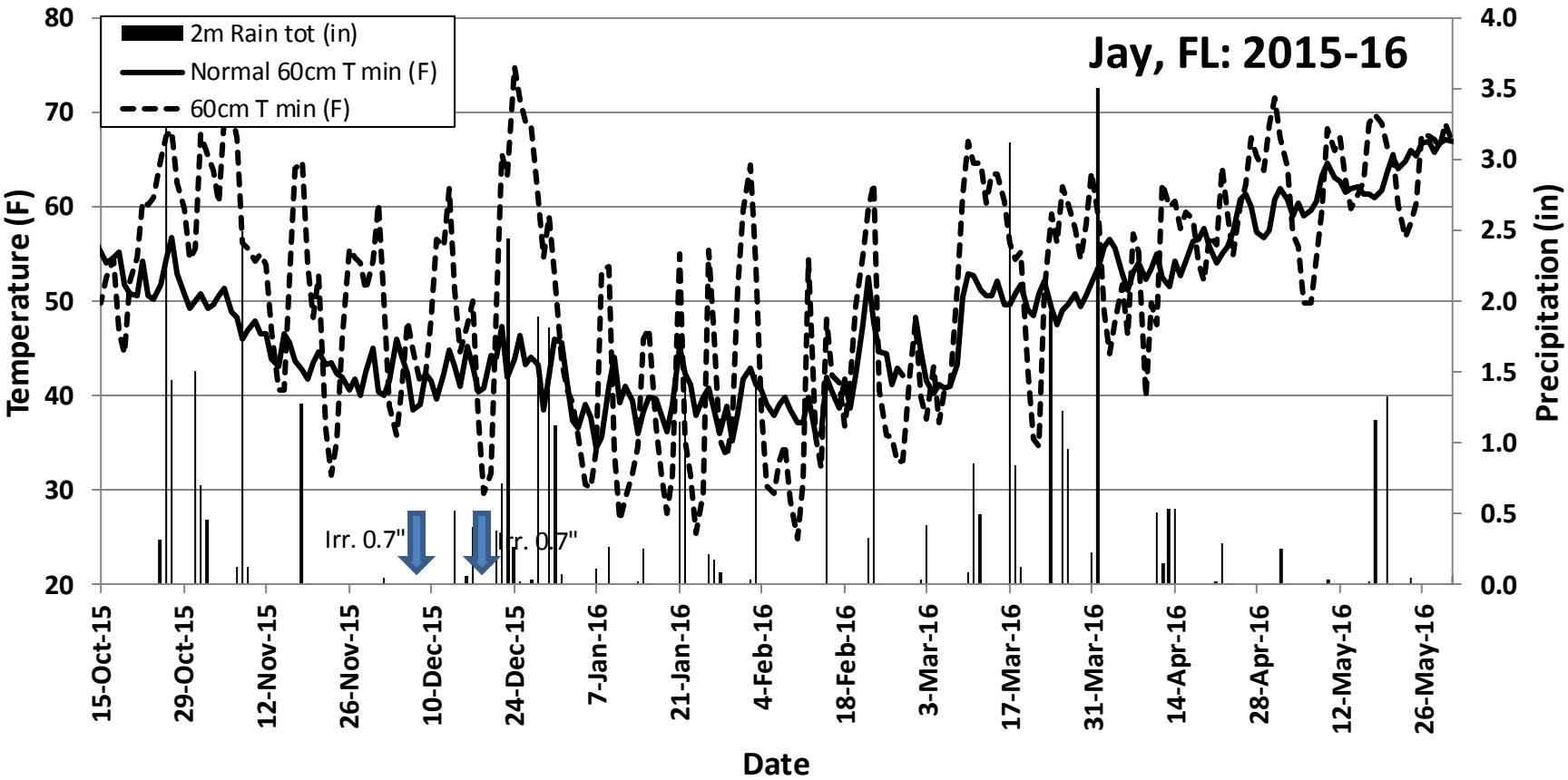
Jay 2015-16 season: Min. temps



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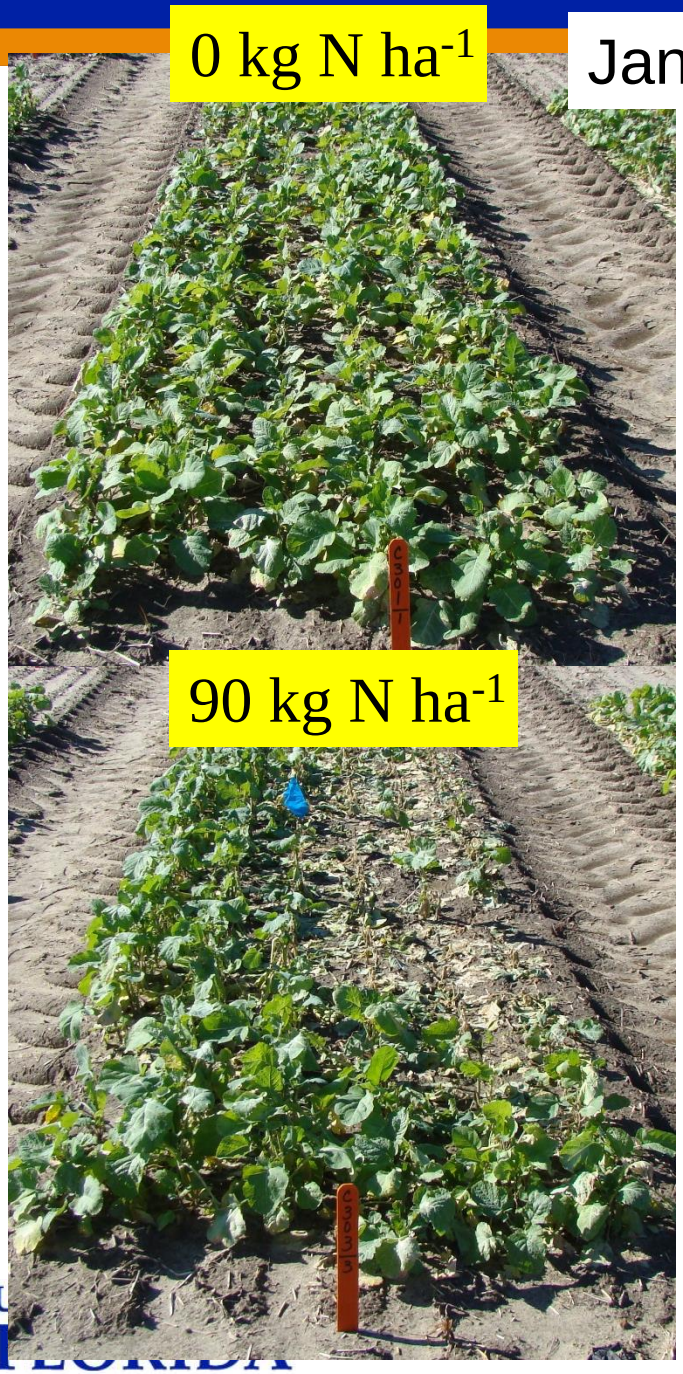
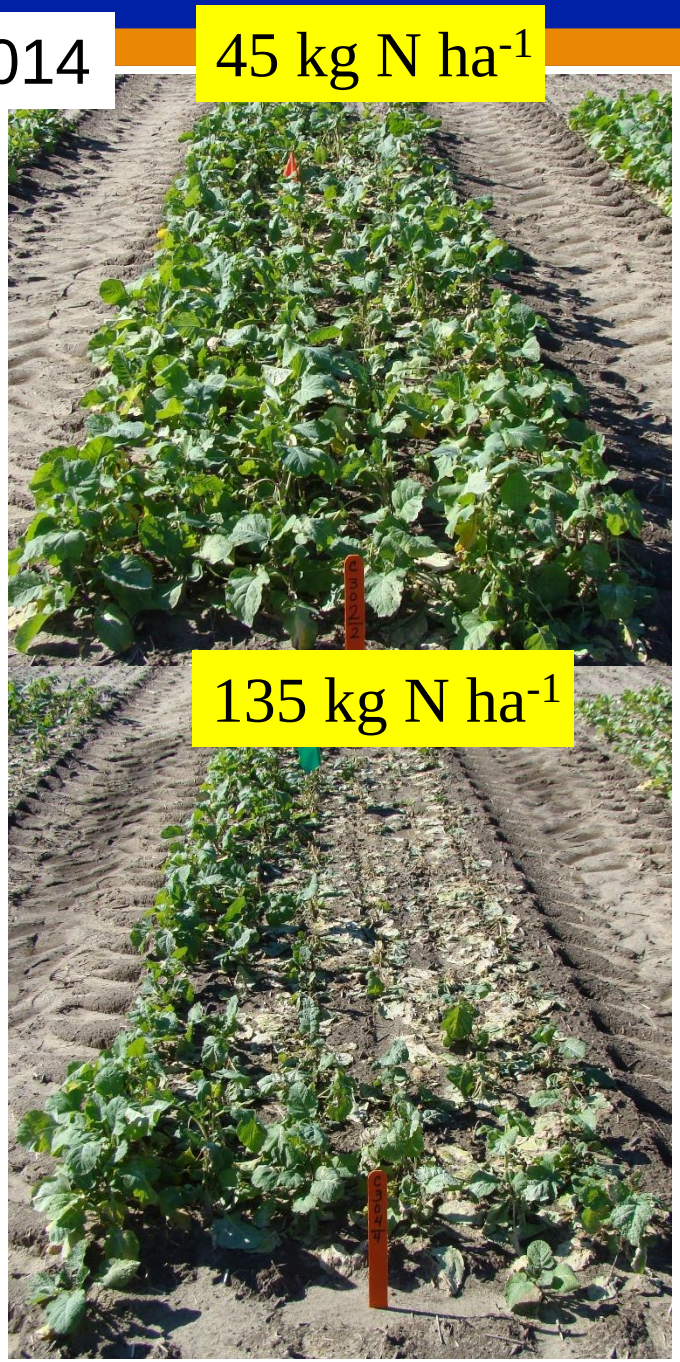
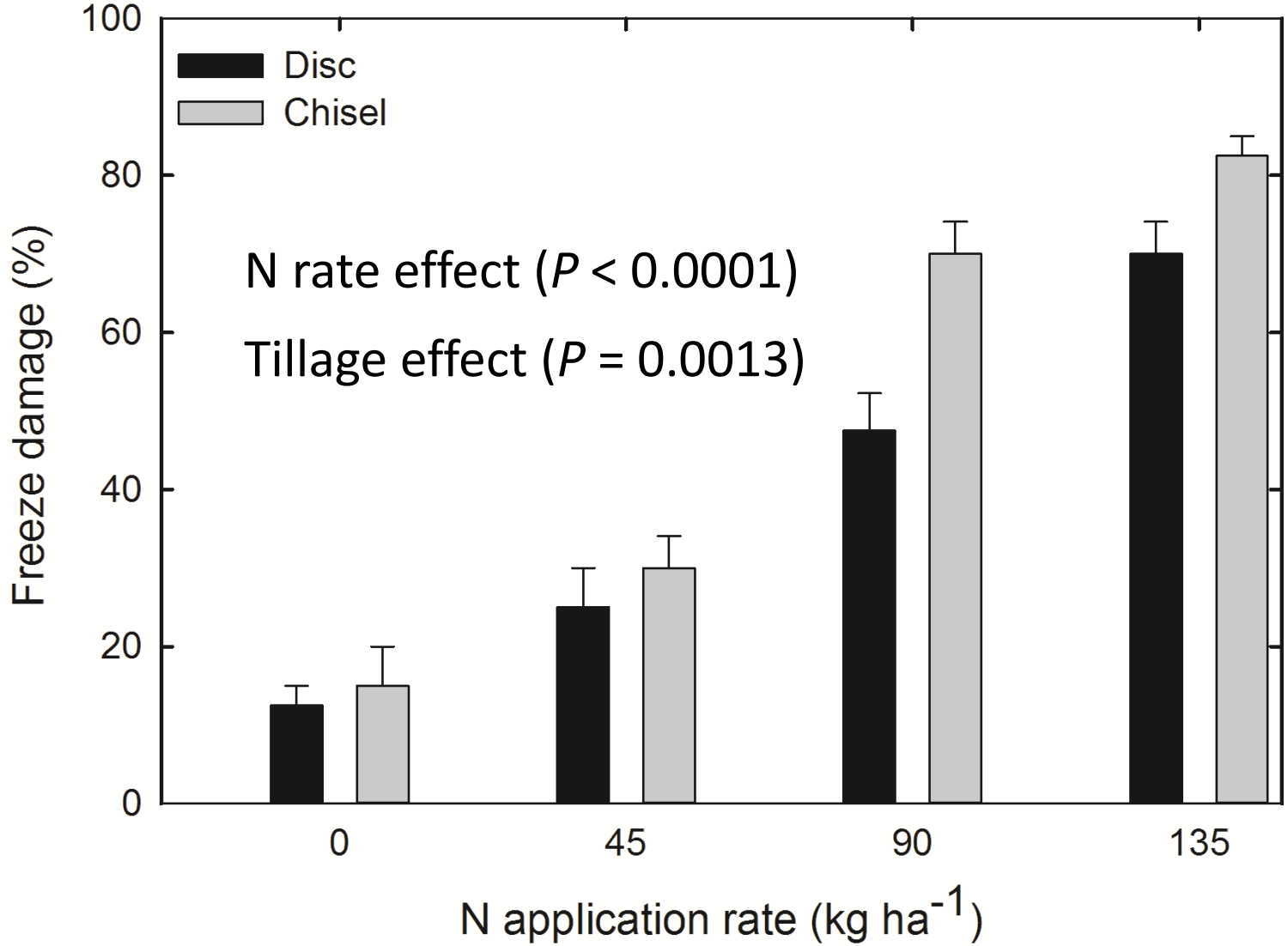
Jan. 15, 2014





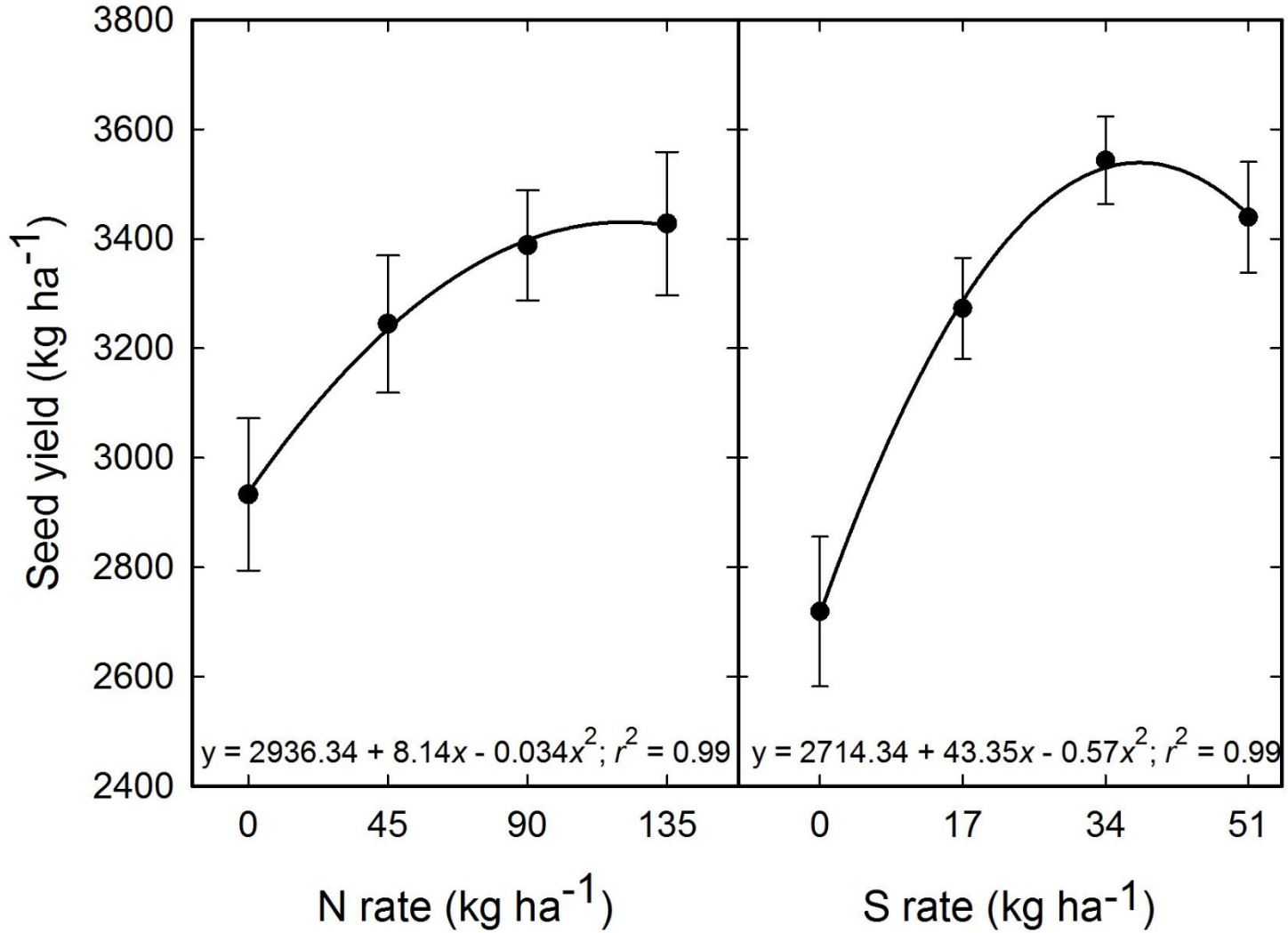
Andy Seepaul

N Rate Effect
Carinata Freeze Injury



Seed yield response to N and S application

N rate = 0.0015, S rate = <0.0001, N rate × S rate = 0.9427



Soil chemical properties

Soil extractable nutrients
Dothan sandy loam
(fine, loamy siliceous, thermic Plinthic Kandiudults)

P	K	Mg	Ca	S	B	Zn	Mn	Fe	Cu	pH	CEC
kg ha^{-1}											meq/100g
68	136	168	874	40	0.34	6	16	28	0.45	6.5	5
M	M	A	A	M	L	A	L	A	L		

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N modified plant growth

N rate	Height	Mainstem nodes	Primary branches	Secondary branches	Pods per plant	Pod length	HI
	cm	no. plant^{-1}				cm	
0	100.4 b	21.6 c	9.2 c	25.7 b	219.9 c	4.5 a	0.39 a
45	111.0 b	22.8 bc	9.7 bc	27.0 b	258.3 cb	4.5 a	0.37 a
90	115.0 ab	24.8 b	10.9 b	37.9 a	343.3 ab	4.6 a	0.38 a
135	133.1 a	28.3 a	13.5 a	43.1 a	393.7 a	4.6 a	0.36 a
LSD	18.3	2.6	1.4	7.7	101.8	0.25	0.10
p-value	0.0089	<.0001	<.0001	<.0001	0.0059	0.5553	0.9311

N rate, $p<0.05$
S rate, $p>0.05$
N rate × S rate, $p>0.05$

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Fatty acids vary with N and S application rates

N rate	MONO	POLY	SATS	LCFA	VLCFA	IV
			%			
0	56.8 a	36.3 c	5.7 a	50.7 b	49.3 a	114.5 c
45	56.3 b	36.6 b	5.6 a	50.9 b	49.2 a	114.9 b
90	56.3 b	36.8 b	5.6 a	51.3 b	48.7 a	115.2 b
135	55.6 c	37.3 a	5.7 a	52.4 a	47.6 b	115.5 a
LSD	0.339	0.2637	0.093	0.7075	0.7075	0.3026
p-value	<.0001	<.0001	0.3598	<.0001	<.0001	<.0001
S rate						
0	56.1 cb	36.9 ab	5.6 a	52.0 a	48.0 c	115.1 ab
17	55.9 c	37.0 a	5.6 a	51.6 ab	48.4 cb	115.3 a
34	56.4 ab	36.6 cb	5.7 a	50.9 cb	49.1 ab	114.9 b
51	56.5 a	36.5 c	5.6 a	50.7 c	49.3 a	114.8 b
LSD	0.339	0.2637	0.093	0.7075	0.7075	0.3026
p-value	0.0065	0.0009	0.8204	0.0027	0.0027	0.0297

MONO=monounsaturated fatty acids (oleic, eicosenoic, erucic acid); POLY=polyunsaturated fatty acids (linoleic, linolenic acid); SATS = saturated fatty acids (palmitic, stearic acid); LCFA=long chain fatty acids (13-21 carbons); VLCFA=very long chain fatty acids (>22 carbons); IV=iodine value

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N timing effect on carinata yield

Quincy, FL, 2015

N timing	Plant density		Yield	
	12/4/14	1/29/15	12/4/14	1/29/15
	plants m^{-2}		kg ha^{-1}	
0N Control	34 a	123 a	2137 g	712 e
100% ESN P	33 a	101 a	3047 de	1670 a
100% P	33 a	107 a	3088 de	1473 a
100% B	41 a	101 a	3174 dc	877 de
100% F	43 a	117 a	2501 f	817 de
50% P + 50% B	40 a	123 a	3377 bc	1433 ab
50% P + 50% F	41 a	114 a	3084 de	1220 bc
50% B + 50% F	36 a	107 a	2852 e	1085 dc
50% P + 25% B + 25% F	43 a	106 a	3684 a	1319 bc
25% P + 50% B + 25% F	37 a	113 a	3498 ab	1356 bc
25% P + 25% B + 50% F	42 a	117 a	3079 de	1309 bc
LSD	15	33	277	292

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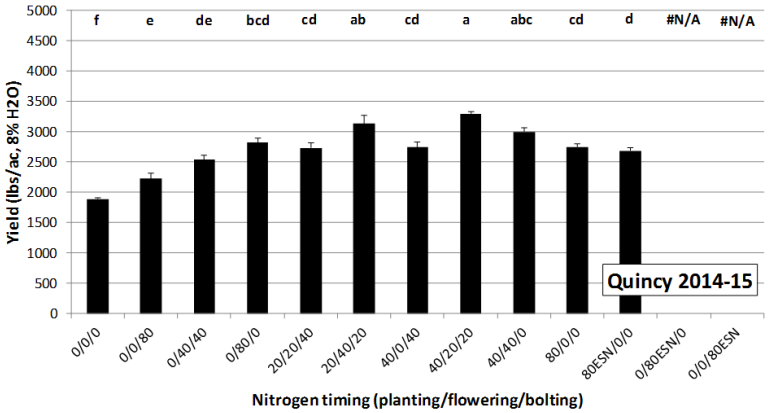
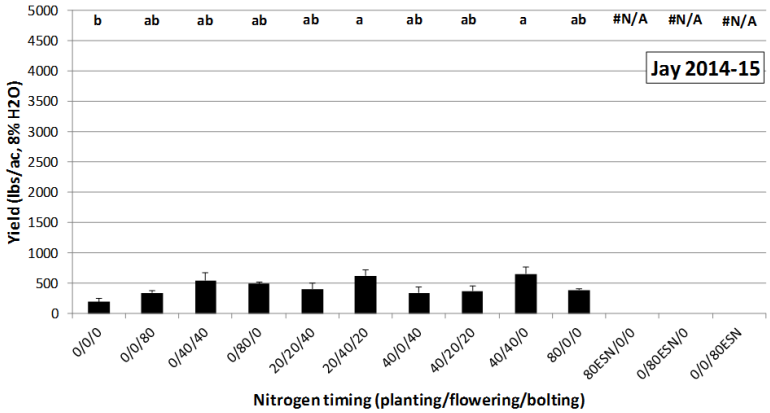
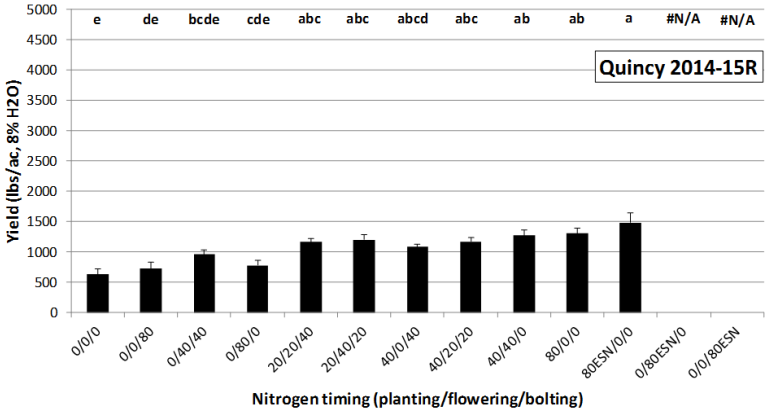
N timing: Yield 2014-15







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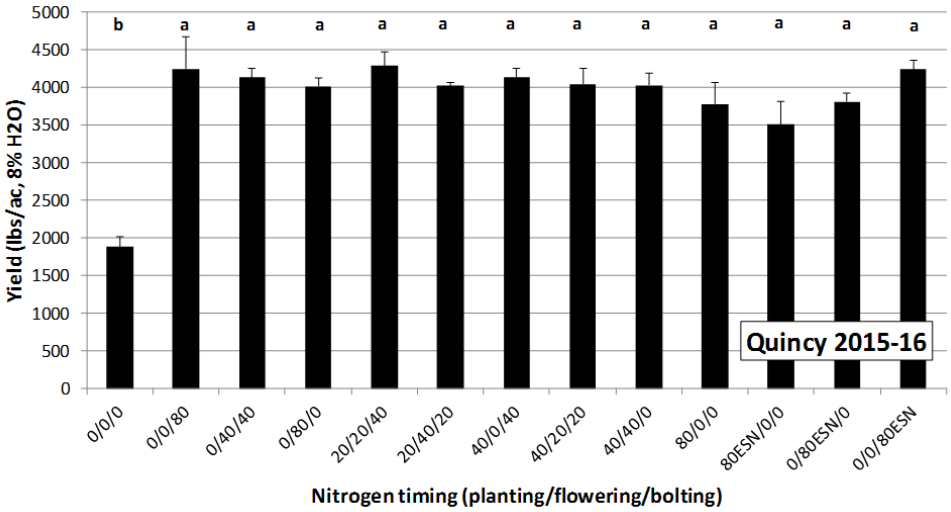
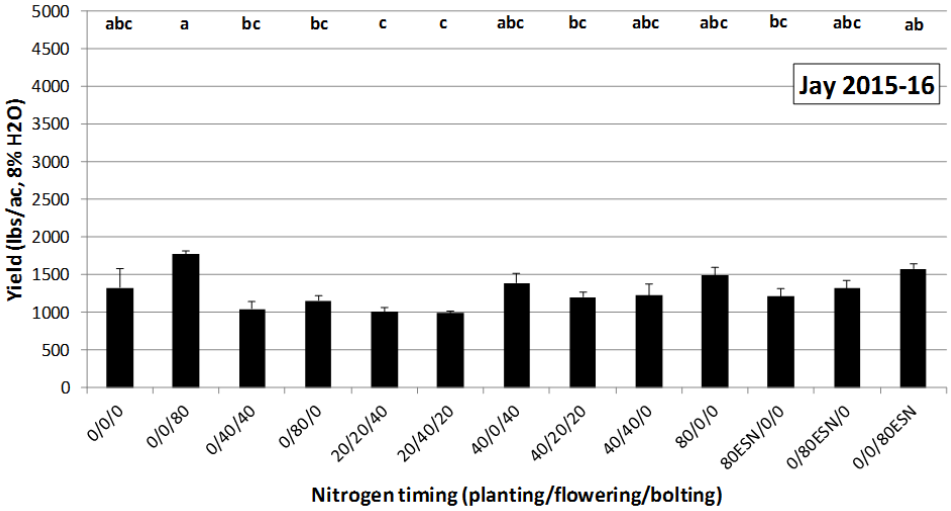
N timing: Yield 2015-16





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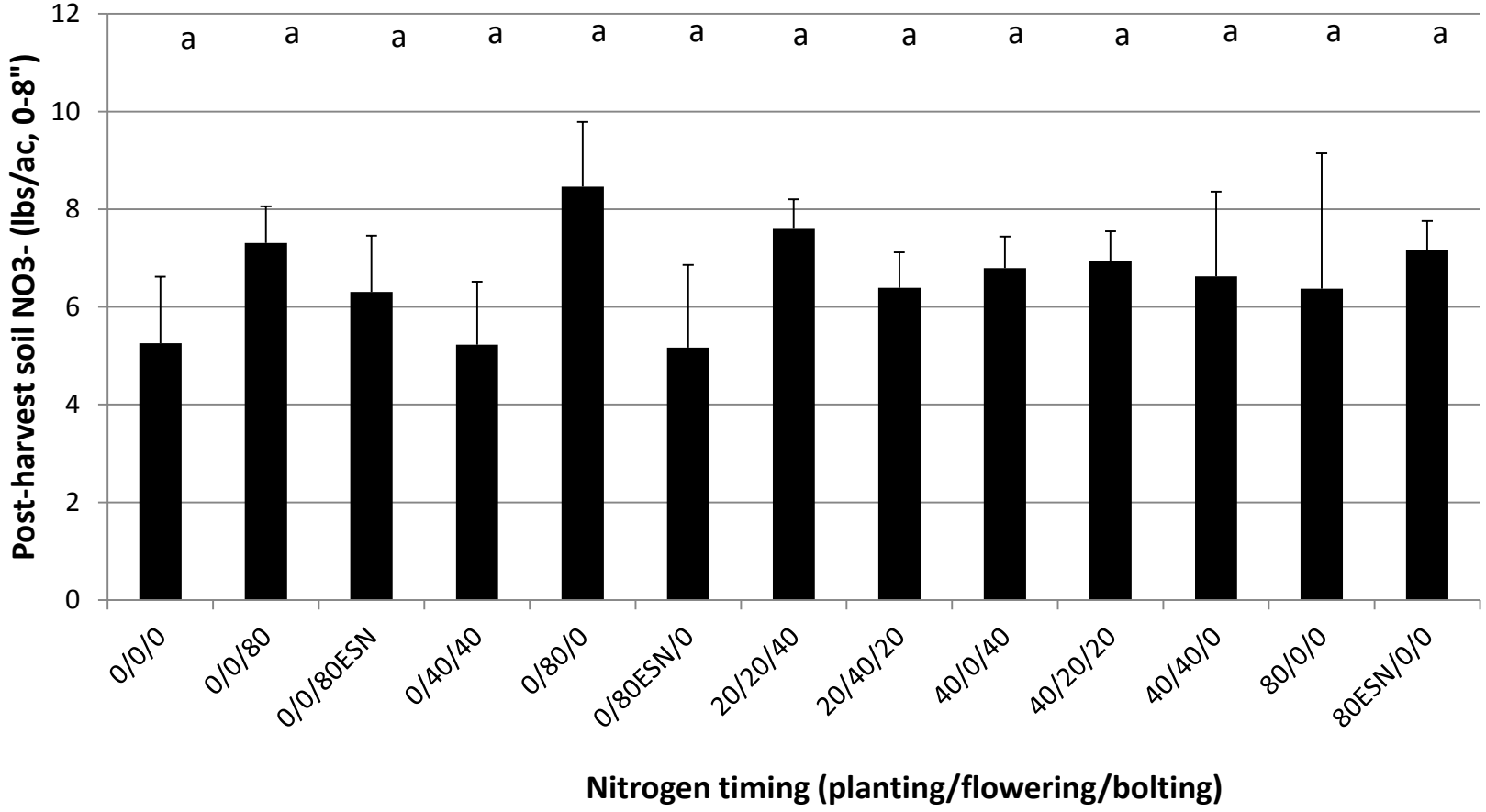
N timing



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Suspected deficiencies in FL

- Boron

Patrick Troy

Patrick Troy

- Mn?

Andy Seepaul

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Sufficiency ranges for canola

SCIENTIFIC NAME	*Brassica napus*
COMMON NAME	**Canola or Rapeseed**
COLLECTED FROM	Production fields
PLANT PART	50 mature leaves (5th from top) without petioles
SEASON	Rosette to pod development
DATA TYPE	Sufficiency Range
CULTIVARS USED	

Macronutrients %		Micronutrients ppm	
N	2.00 - 4.50	Fe	30 - 200
P	**0.28 - 0.69**	**Mn**	**25 - 250**
K	2.90 - 5.10	B	15 - 54
Ca	**1.00 - 3.00**	**Cu**	**4 - 25**
Mg	0.20 - 0.75	Zn	22 - 49
S	**0.17 - 1.04**	**Mo**	**0.25 - 0.60**

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Bryson & Mills. 2014. Plant Analysis Handbook IV.

Tillage and rooting

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Preliminary guidelines

- Don't ignore S requirements
  - 25 lbs S
  - Consider 50% S at planting, 50% at bolting
- 80 lbs N/ac split:
  - 20 lbs N/ac at planting
  - 60 lbs N/ac at bolting
  - May not see a response, but will minimize risk to freeze injury
- 40 lbs P_2O_5/ac
- 80 lbs K_2O/ac: split on sandy soils

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Thank you

- Agrisoma
  - Jeff Klingenberg
  - Christine Bliss
- David Wright
- Andy Seepaul
- Sheeja George
- Moo Brown

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