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Rationale

Production of winter rapeseed (*Brassica napus* L.) with high erucic acid content has recently been introduced into NC. This project investigates N & S fertility management recommendations.

Objectives

- 1) Measure yield, seed quality and plant tissue nutrient levels in response to N and S management treatments.
- 2) Evaluate N timing strategies (early + late split, late only)



Figure 1. Visual response to early topdress N at Caswell Farm 2014, and normal and N-deficient rapeseed plants from the Peanut Belt in 2013.

Methods & Materials

Single-year N & S Response Experiments (6), 2012/13, 2013/14, & 2014/15 seasons.

-Caswell Research Station

2012/13 Norfolk loamy sand, Typic Kandiodults, well-drained

2013/14 Johns sandy loam, Aquic Hapludults, moderately well- or somewhat poorly drained

2014/15 Stallings loamy sand, Aeric Paleaquults, somewhat poorly drained

-Tidewater Research Station

Portsmouth fine sandy loam, Typic Umbraquults, very poorly drained

Table 1. Fertilizer treatments.

#	N late January	N February	Total N (all 22 kg at plant)	S late January
	kg nutrient ha ⁻¹			
1	0	0	22	0
2	0	0	22	34
3	0	90	112	0
4	0	90	112	34
5	45	45	112	0
6	45	45	112	34
7	0	179	201	0
8	0	179	201	34
9	90	90	201	0
10	90	90	201	34
11	0	269	291	0
12	0	269	291	34
13	134	134	291	0
14	134	134	291	34

Long-Term Soil Fertility Experiments 2012/13 & 2014/15

-Peanut Belt Research Station

Goldsboro sandy loam, Aquic Paleudults, moderately well drained

*Seed yields adjusted to 9% moisture; protein, oil, and erucic acid concentrations measured by NIR scan.

Single-year N & S Experiments

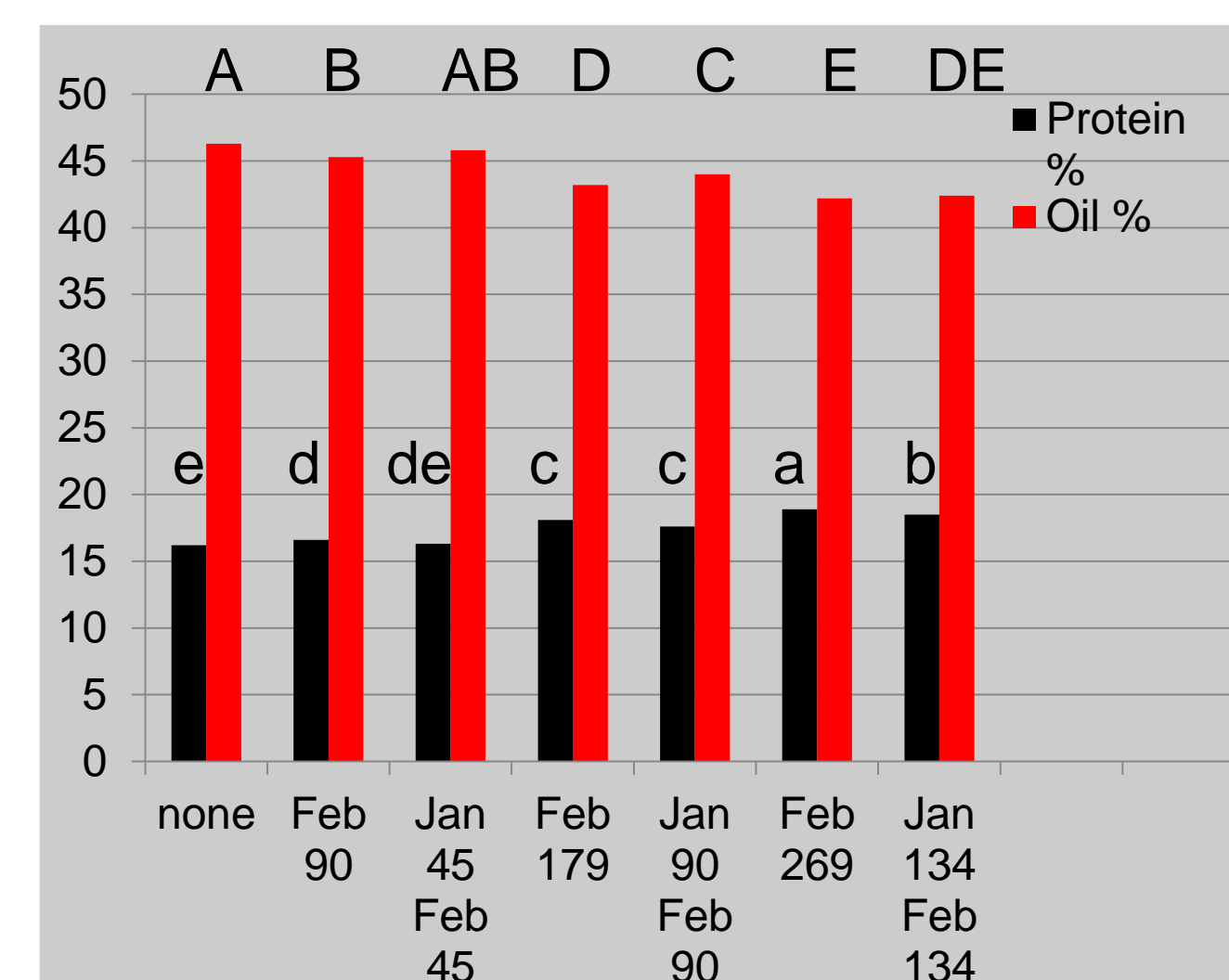


Figure 2. Responses to N averaged across 6 sites. Symbols indicate differences in protein(lowercase), and oil concentration (uppercase) p<0.05. Protein concentration increased with added N, with a corresponding decrease in oil concentration.

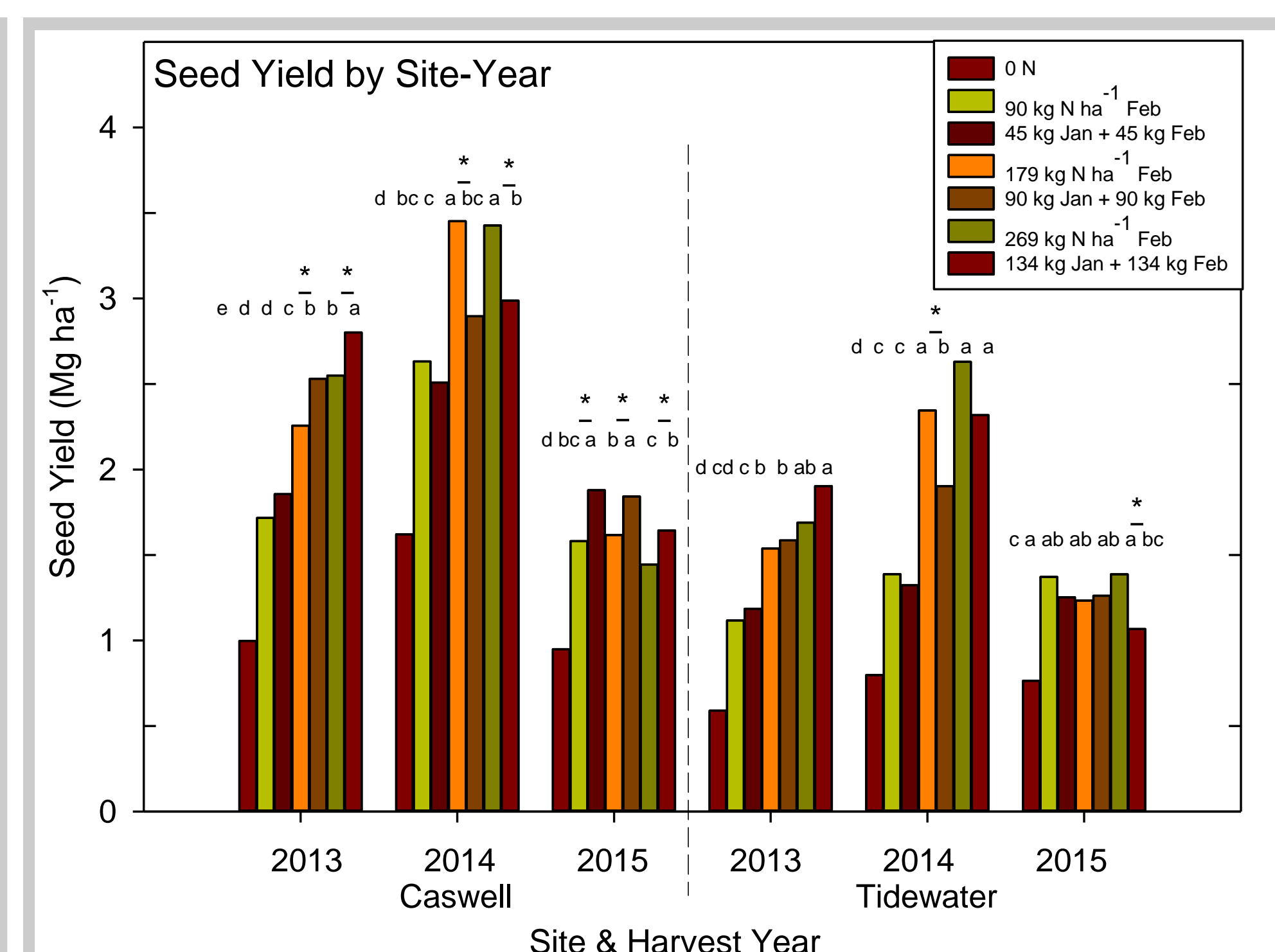


Figure 3. Responses to N treatments for each of the 6 sites. Letters indicate differences among treatments at each site and * symbols indicate differences among N timing treatments receiving the same total N rate (p<0.05).

Table 2. Means of S treatments pooled across N treatments, averaged across 6 sites and for Tidewater sites. Values followed by different letters within a column differed significantly at the: 0.05 (uppercase letters), or 0.1 (lowercase letters) probability level. No significant response occurred at any of the Peanut Belt Research Station sites.

S Rate (kg ha ⁻¹)	Seed Yield (Mg ha ⁻¹)	Protein (%)	Oil (%)	Erucic Acid (% of Oil)
Average across all sites				
0	1.76 B	18 a	44 b	54
34	1.88 A	17 b	45 a	54
Tidewater, 2013				
0	1.25 b	16.3 A	45.4 B ¹	56
34	1.50 a	15.8 B	46.3 A	57
Tidewater, 2014				
0	1.69 b	17.5 a ¹	46.0 B	53
34	1.94 a	17.2 b	47.0 A	53
Tidewater, 2015				
0	0.91 A ¹	17.2 A	42.9 b ¹	54 A
34	1.46 B	16.3 B	46.1 a	53 B

¹ N x S interaction was also significant, p<0.05.

Long-term Fertility Experiments

Table 3. Responses to N rates at Peanut Belt Research Station site. (Omission of N or application 2 actual N rates, as appropriate for each crop, during the past 10 crop years.)

N Rate (kg ha ⁻¹)	Seed Yield (Mg ha ⁻¹)	
	2013	2015
0	0.69 e	0.38 e
101	1.19 d	0.56 de
202	1.88 ab	0.75 cd

Values followed by different letters within a column differed significantly at the 0.05 probability level.

Summary

-Seed protein increased while oil concentration declined in response to N

- Seed yield increased with N at all sites
- Split N > single late N (at same rate) in 2 of 3 years at Caswell
- Single late N treatments > split N (at same rate) in 2 of 3 years at Tidewater and 1 of 3 years at Caswell

-S led to higher yields (+0.2-0.3 Mg ha⁻¹) and higher oil concentrations, only at Tidewater on the very poorly drained Portsmouth soils. Response at more poorly drained sites, rather than on better-drained sandier sites, suggests likelihood of rooting problems associated with drainage rather than S leaching.



Acknowledgements
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