

Rationale

- Brassica carinata (carinata), a non-food oilseed feedstock, is of interest due to seed oil physical and chemical properties equivalent to petroleum-derived fuels
- Carinata has demonstrated good yield potential as a winter biofuel crop in the south eastern (SE) United States (US)
- In order to fit B. carinata in the existing cotton-peanut cropping system in the SE US, early maturity genotypes are needed. However, nutrient uptake and accumulation data for early maturity genotypes are not well documented in carinata literature
- There are limited data regarding temporal nutrient accumulation and partitioning dynamics of carinata (Brassica carinata). As a recently introduced crop in the SE US, such studies inform the rate of macro and micronutrient accumulation and aid fertility management decisions

Research questions

- Does dry matter accumulation and nutrient uptake differ among early season carinata genotypes compared to a full season genotype?
- Does dry matter accumulation and nutrient uptake differ for commercial full season genotype at two different latitudes in the SE US?

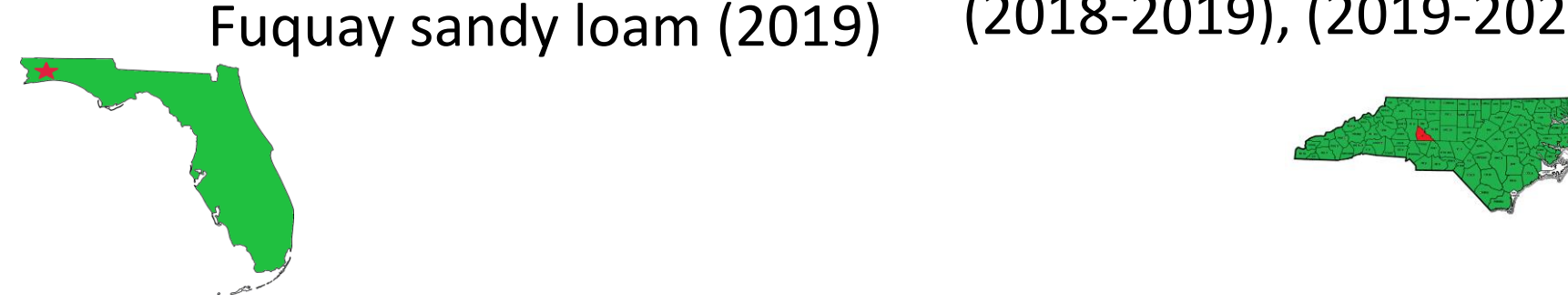
Objective

- To quantify nutrient uptake and partitioning across maturity classes
- To determine if nutrient uptake and partitioning will differ among latitudes for full season genotype

Materials and methods

Field sites

Location: Jay, FL (2018-2020) Salisbury, NC (2018-2020)
 Soil type: Red bay sandy loam (2018) Soil type: Lloyd clay loam (2018-2019), (2019-2020)
 Fuquay sandy loam (2019)



Experimental design and setup

Location: Jay, FL (2018-2019) and (2019-2020)
 Salisbury, NC (2018-2019) and (2019-2020)
 Design: RCB, reps
 Treatment: (3 genotypes)
 DH-157.715 (Early season)
 M-01 (Mid season)
 Avanza-641 (Full season)
 Note: Only Avanza-641 was planted across 2 site-years in NC

Methods

- Plant tissue samples were sampled at multiple growth stages and partitioned into leaves, stems (petiole plus stem), reproductive parts (flowers and pods), and seed to determine biomass and nutrient accumulation
- Partitioned biomass was dried and ground to pass a 2mm screen, chemically digested in a digestion block with nitric acid, and subjected to elemental analysis using inductively coupled plasma optical emission spectrometry (ICP-OES)
- Total carbon and total nitrogen were analyzed by dry combustion (AOAC, 2006).
- Total nutrient uptake was determined by multiplying aboveground dry matter by nutrient concentration.
- ANOVA using PROC GLIMMIX procedure in SAS version 9.4
- Multiple comparison procedures were done using Fisher's protected least significant difference (LSD) at 95% confidence level

Results

Biomass response across different maturity groups

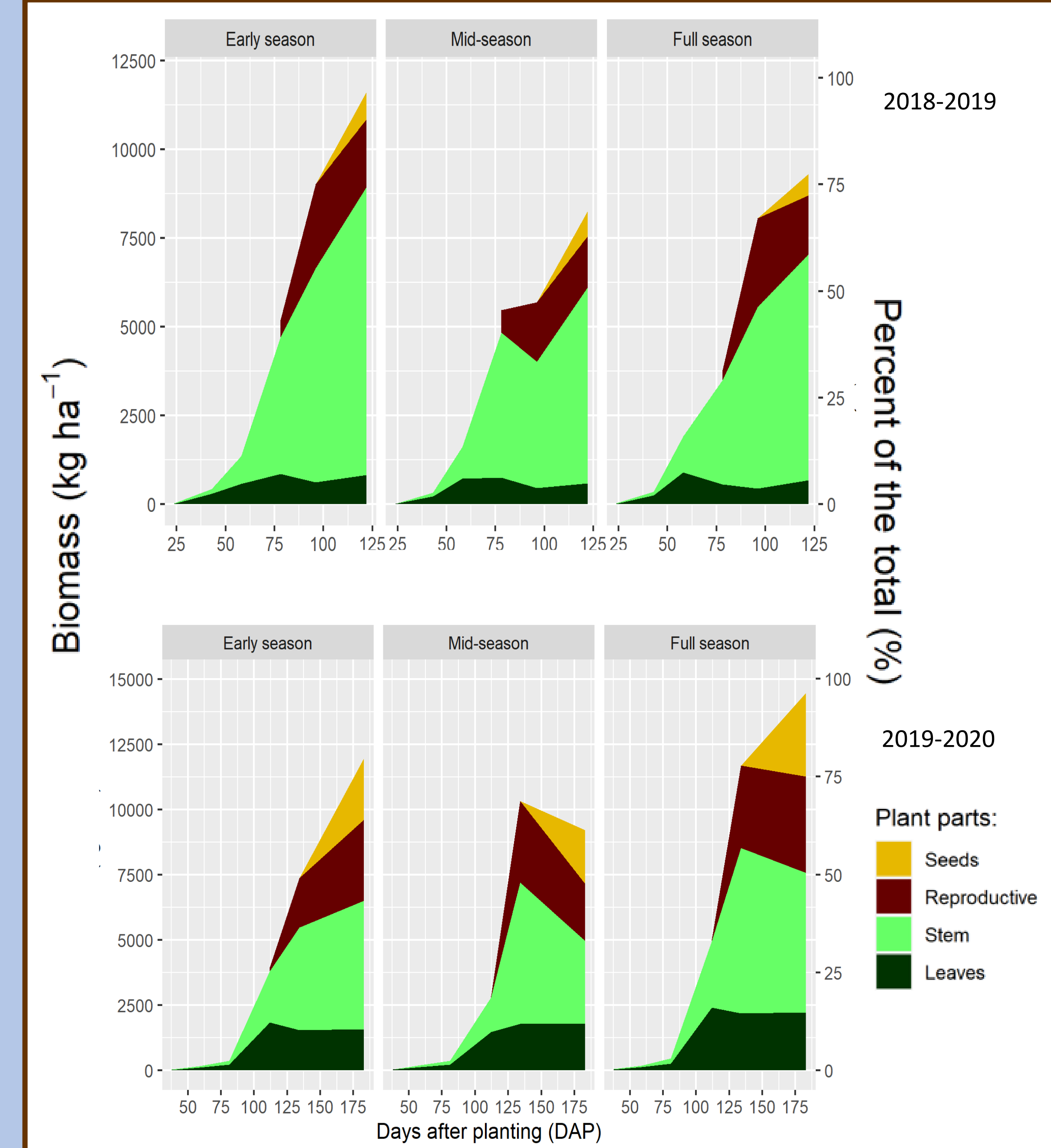


Figure 1: *Brassica carinata* seasonal biomass accumulation and partitioning across three maturity groups during 2018-2019 and 2019-2020 growing seasons at Jay, FL.

End of season nutrient uptake across latitudes

Table 1: *Brassica carinata* end of season dry matter partitioning across Jay, FL and Salisbury, NC during 2018-2019 and 2019-2020 growing seasons

EFFECT	Jay	Salisbury
	-----kg ha ⁻¹ -----	
<u>2018-2019</u>		
leaf	678a	3b
stem	6366a	1161b
reproductive	1656a	1320a
seed	1250a	611b
<u>2019-2020</u>		
leaf	2221a	66b
stem	5355a	5576a
reproductive	3693a	2735a
seed	3188a	2355a

Means comparison for the end of season dry matter accumulation across sites indicate that the leaf and stem dry weight was greater in Jay, FL compared to Salisbury, NC during the 2018-2019 growing season. Similarly, reproductive dry weight was similar across two sites while the seed dry matter was lower in Jay, FL compared to Salisbury, NC. Leaf dry matter includes the total leaf collected at Jay site for two years including abscised leaves which was not collected at Salisbury, NC. The dry matter partitioning was generally similar across the two sites for 2019-2020 growing season.

Conclusions

- There were no significant differences for N, P, K, S and B uptake among maturity groups for the 2018-2019 season and were generally similar during 2019-2020 season (data not shown). Greater biomass accumulation was observed for full season genotype during 2018-2019 season at Jay, FL compared to Salisbury, NC while it was similar during 2019-2020 season at both locations.
- Based on two site year of data at Jay, FL nutrient management practices may not differ for the early season maturity classes while it may differ across latitudes

Acknowledgement