Soybean Maturity Group IV and V Response to Seeding Rate in Virginia

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INTRODUCTION

- Planting the least amount of seed to optimize yield potential, while not compromising yield, increases soybean grower profitability.
- Research has indicated that greater seeding rates are needed in low yielding environments while high yielding environments utilize less seed.
- Due to new technology advancements, site-specific defined seeding rates may enhance return on investment for growers.

OBJECTIVES

I. Determine the response of full-season and double-crop soybean cultivars to seeding rate under different yield environments.
II. Define the relationship of Normal Difference Vegetative Index (NDVI) readings with yield.

MATERIALS AND METHODS

- Research conducted at 20 site-years from 2017-20 across Virginia (Figure 1)
- Seeding Rate (x1000/ha):
  - Full-season: 74, 148, 222, 297, 371, and 445
  - Double-crop: 198, 297, 395, 494, 544, and 593
- Randomized complete block (RCB) with 4 replications:
  - Split plot in 2019-20 with two varieties/ maturity group (MG)
- Asgrow Varieties with MG (use varied with year):
  - MG IV: AG47X6, AG48X7, and AG48X9
  - MG V: AG 52X9, AG54X6, AG56X8, and AG58X9
- Plant stand determined at V2-V3
- NDVI measurements collected beginning at V5-V7 using a Greenseeker 0.3 m above canopy
- Yield determined and adjusted to 13% moisture
- Yield was converted to relative yield for all site years
- Data subjected to analysis of variance and interaction between site, seeding rate, and maturity group determined
- Relative yield was then regressed on plant population density (PPD) using linear regression techniques across sites within relative maturity (RM)
- 2020 relative yields were regressed on Area Under NDVI Curve (AUNDVIC) with linear regression techniques

$$\text{AUNDVIC} = \sum_{i=1}^{n-1} \left[(y_i + y_{i+1}) / 2 \right] (t_{i+1} - t_i)$$

where n is the number of observations, y is the NDVI reading at time t (day of year), and i is the i_{th} rating date

RESULTS

Figure 2. Response of MG4 full-season relative yield to plants per hectare at site years in Virginia, 2017-20.

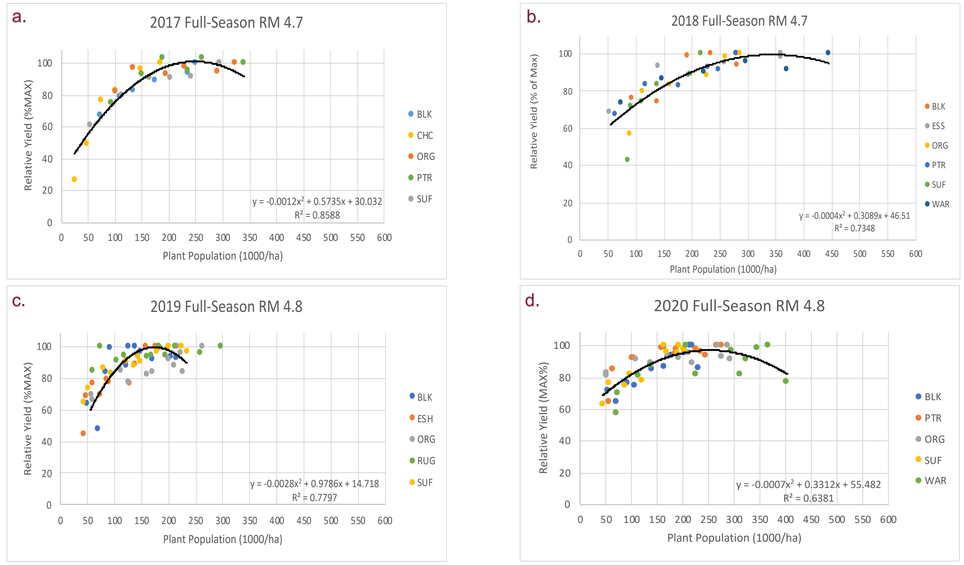


Figure 3. Response of MG4 double-crop relative yield to plants per hectare at site years in Virginia, 2017-20.

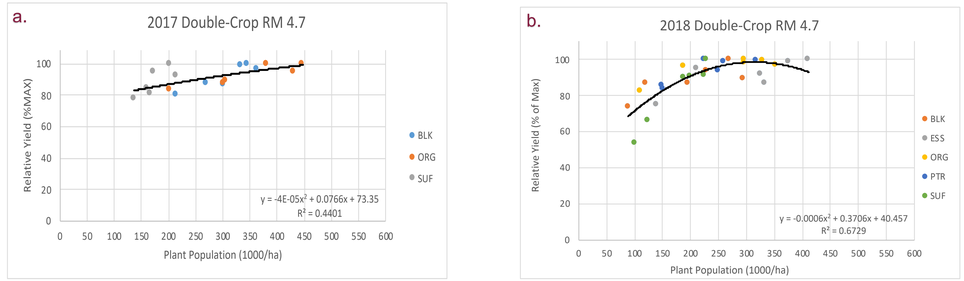


Figure 4. MG4 relative yield response to AUNDVIC at site years in Virginia, 2020.

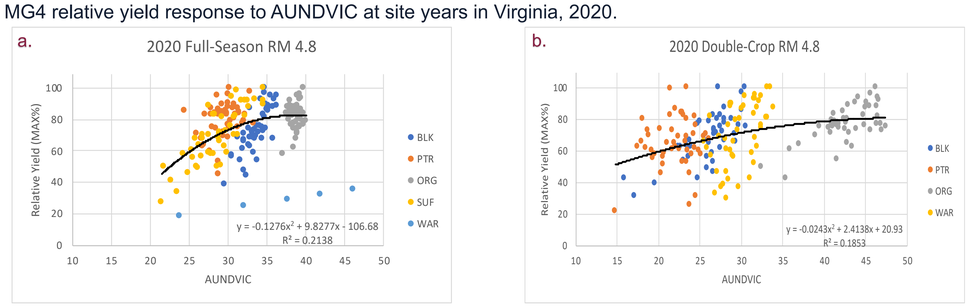
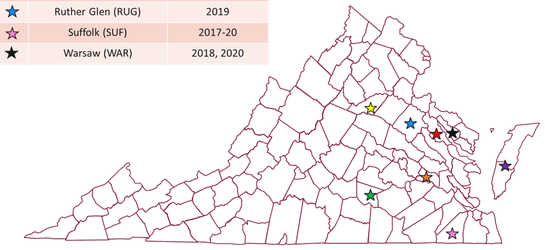


Figure 1. Location and site-year of experiments in the state of Virginia between 2017-20.

	Location	Year
★	Blackstone (BLK)	2017-20
★	Charles City (CHC)	2017
★	Essex (ESS)	2018
★	Orange (ORG)	2017, 2019-20
★	Painter (PTR)	2017-20
★	Ruther Glen (RUG)	2019
★	Suffolk (SUF)	2017-20
★	Warsaw (WAR)	2018, 2020



DISCUSSION

- Yield responded to PPD varied with year and occasionally at site within year.
- MG IV and V showed similar response; only MG IV is displayed due to space.
- Poor stand in 2019 was due to planter malfunction.
- Yield was maximized at 150-200k seed/ ha in full-season.
- Yield was maximized at 300-400k seed/ha in double-crop.
- There was a relationship between relative yield and NDVI in 2020 across all sites.
- Additional statistical analysis will be performed, using linear and non-linear techniques.

MOVING FORWARD

- Economic analysis will be performed using variable seed cost and soybean prices.
- Develop yield zones with remotely sensed data to precede future development of variable-rate soybean seeding rate maps.

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