**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, 287, 371, and 445
  - Double-crop: 198, 297, 385, 494, 564, 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, AG65X8, 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

\[
AUNDVIC = \frac{1}{n} \sum_{i=1}^{n} \left[ \frac{NDVI_{i}}{y} \right] \frac{d}{dt} [-\ln (1-e^{-y})] 
\]

where \( n \) is the number of observations, \( y \) is the NDVI reading at time \( t \) (day of year), and \( t \) is the \( t \) 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.

**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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