Potential of Variable-Rate Seeding for Site-Specific Plant Growth Management in Cotton

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Background

- **Rank growth in Cotton -** tall and excessive vegetative growth
  - plants more susceptible to boll rot and late season insects
  - delays maturity and makes it more difficult to defoliate

- **Plant Growth Regulator (PGR)**
  - used to manage vegetative growth
  - proper rate and timing is important
  - uniform applications are most common
  - few growers utilize "spot spray" method

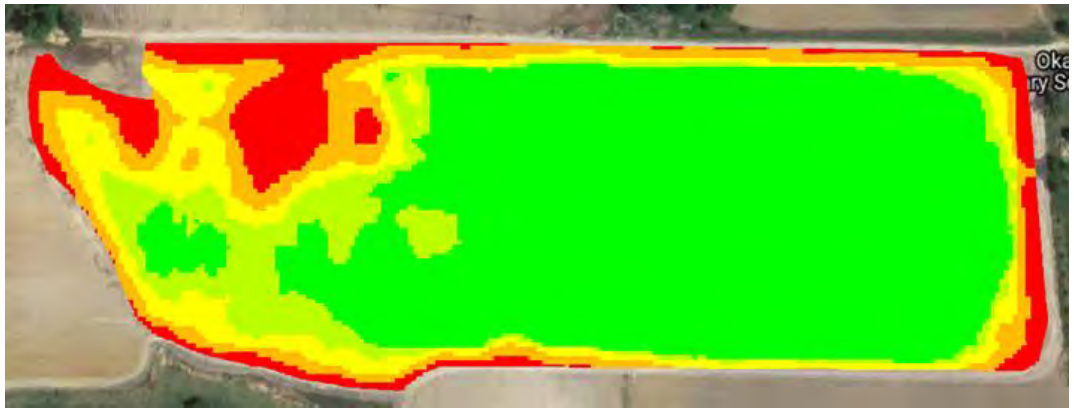
Source: UF | IFAS Extension

INTRODUCTION

- **Challenge -** Spatial variability within the fields in the Southeastern US (soil type, elevation, etc.)
  - Grower interest in better management strategies to address growth variability

Aerial imagery showing differences in soil types across a field

- **Seeding Rate/Plant Population -** area between plants, competition, canopy coverage, sunlight penetration and yield



In-season satellite imagery showing crop growth variability

Can seeding rate be adjusted appropriately in certain field areas (management zones) to reduce the potential of rank growth?

OBJECTIVE

Evaluate variable-rate seeding as one of the strategies for site-specific plant growth management in cotton

Methods

Field 1:

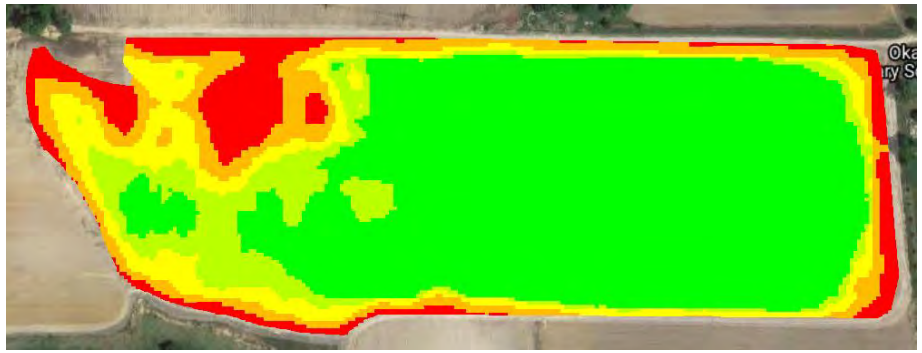
- Colquitt County, GA
- 27.5 ha
- Irrigated

Management Zones:

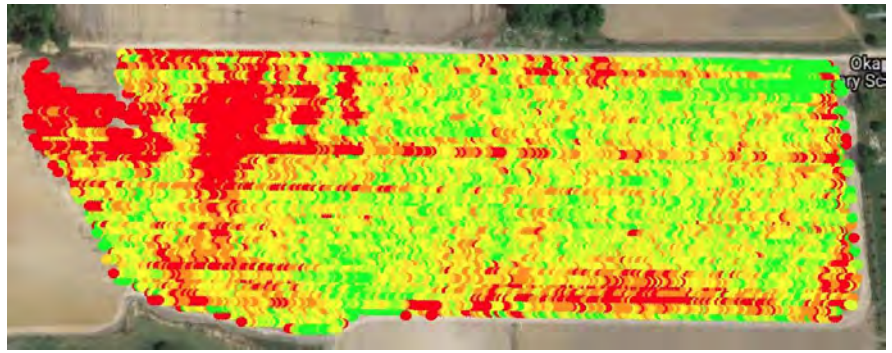
- Soil Type
- Crop Health
- Yield

Soil Type

Crop Health



Yield



Methods

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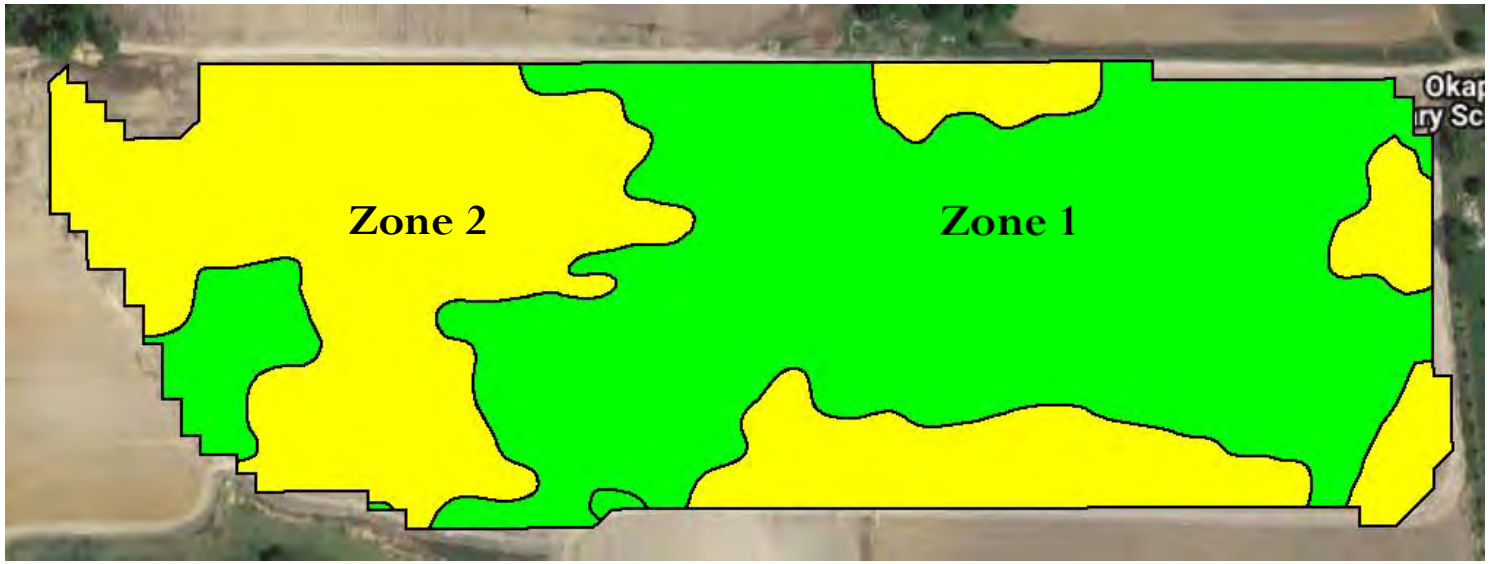


Management Zones:

- Soil Type
- Crop Health
- Yield

Field 2:

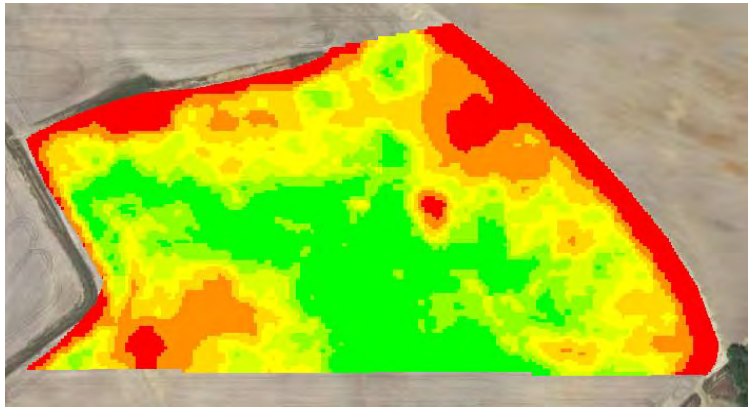
- Dougherty County, GA
- 12.1 ha
- Irrigated

Soil Type

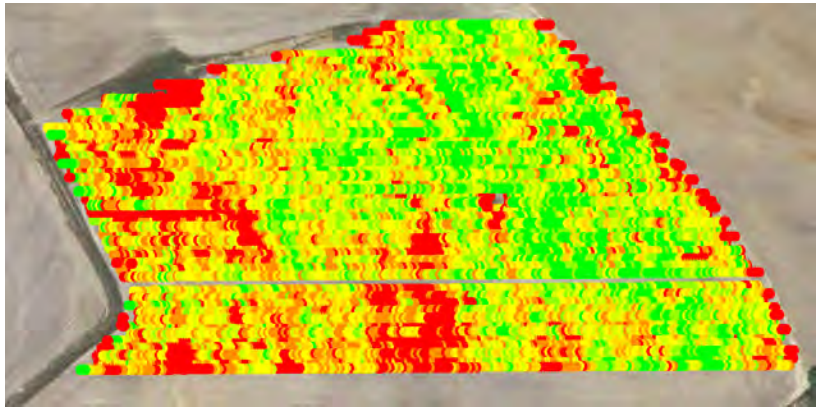
Management Zones:

- Soil Type
- Crop Health
- Yield

Crop Health



Yield



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Management Zones:

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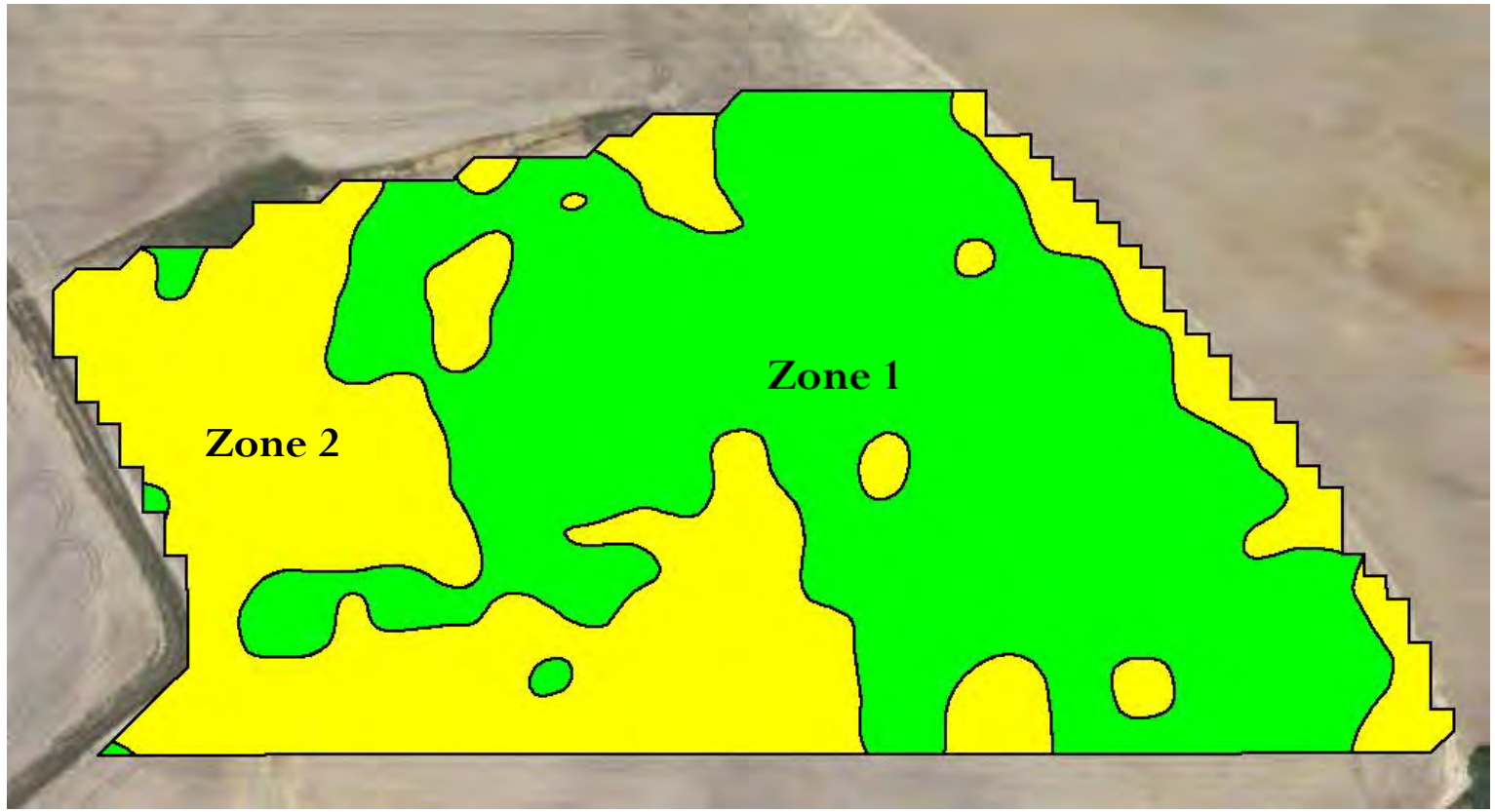
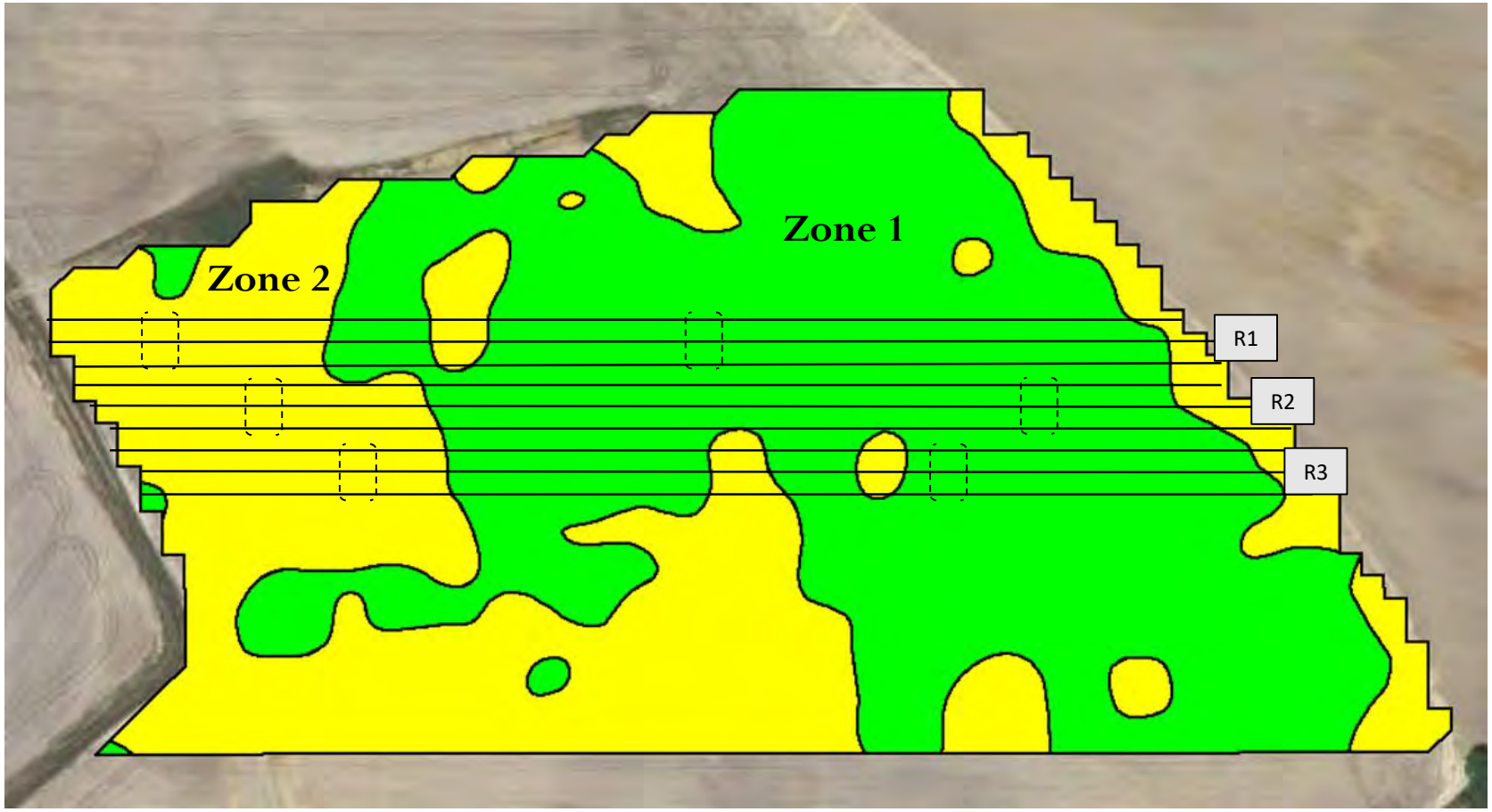


METHODS

Study Layout:

- Zone – 1 & 2
- Three Seeding Rates
  - 53.1 ksds/ha
  - 63.0 ksds/ha
  - 72.9 ksds/ha) *(Grower Nominal)*
- Three Replications
- 9 Randomized Passes



12-row planter @91.4 cm spacing; planter = 10.9 m

Field 1: DP2012; Field 2: DP2038

❑ Data Collection

(randomly selected locations in center 6 rows)

- Emergence (stand counts)
  - *3.0 m of row*
- Plant Heights & Node Counts
  - *60 plants (in center 6 rows)*
- Yield *(12-rows)*
  - *Weighing each pass separately*
  - *Yield map*

❑ Data Analysis

- Two-way ANOVA using JMP Pro 15
- Means comparison using a $p \leq 0.10$

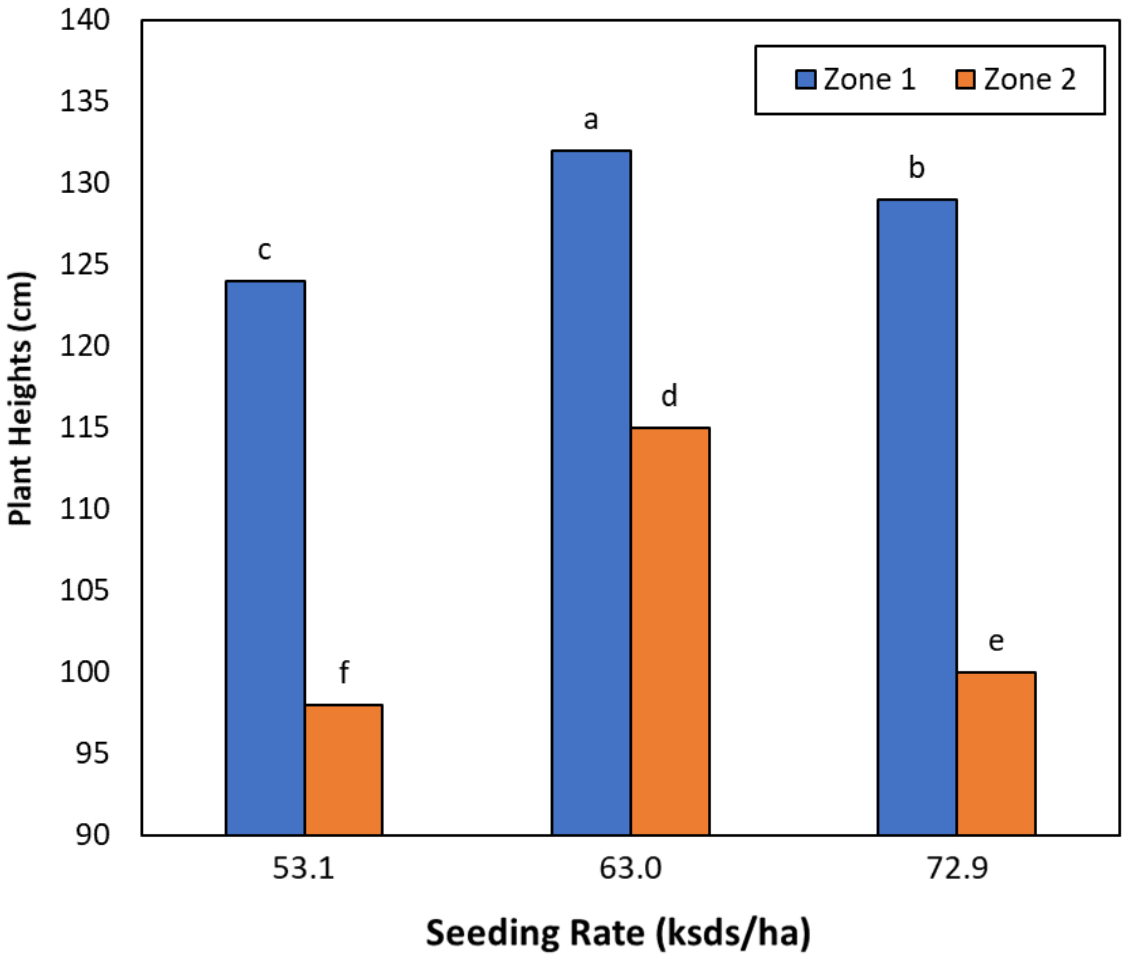
Results

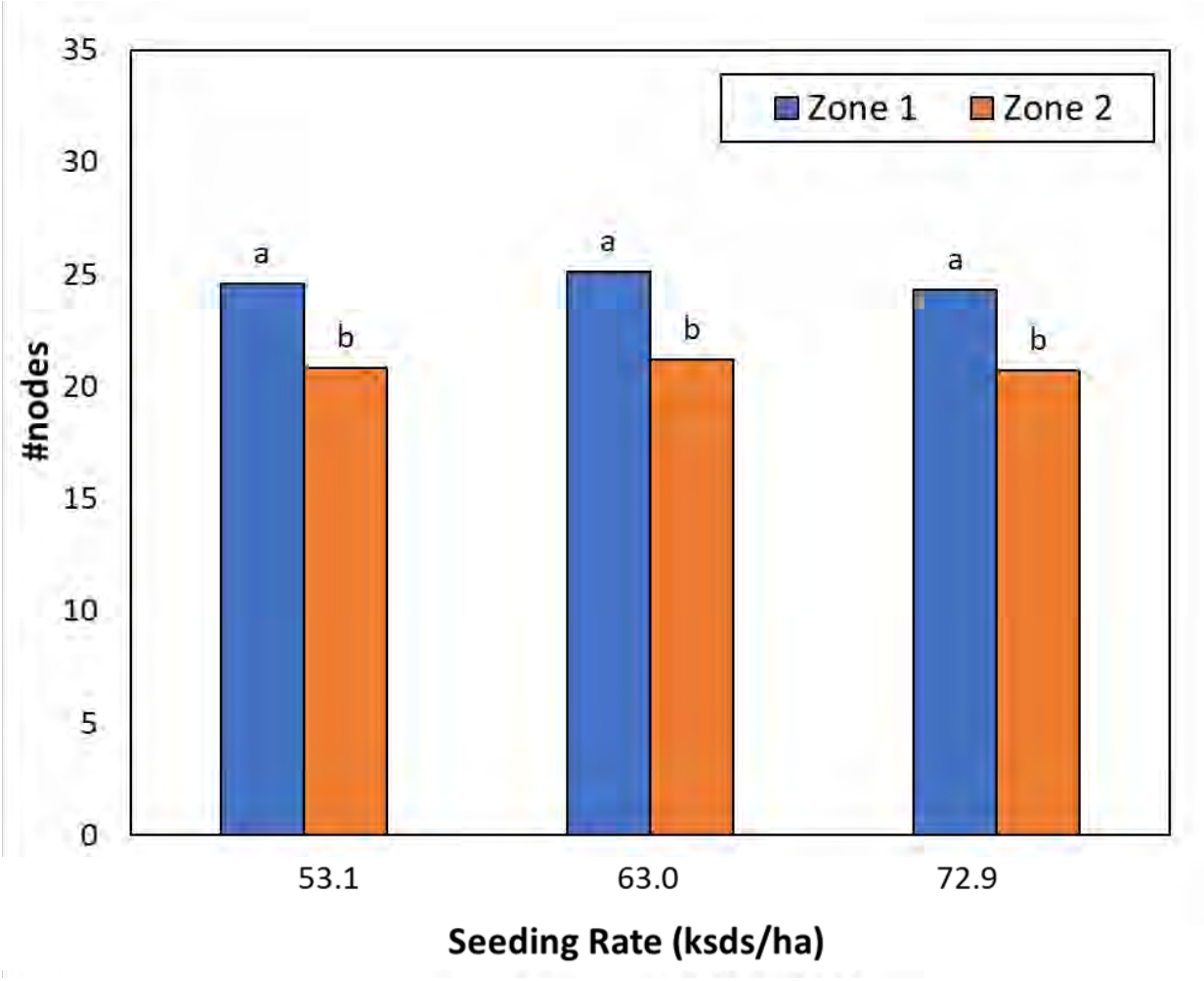
Field 1

Zone	Target Rate (ksds/ha)	Population (plants/ha)	Emergence (%)
1	53.1	50,230 c	95% a
1	63.0	59,531 b	94% a
1	72.9	69,099 a	95% a
2	53.1	47,107 c	89% a
2	63.0	49,632 c	79% b
2	72.9	55,879 b	77% b

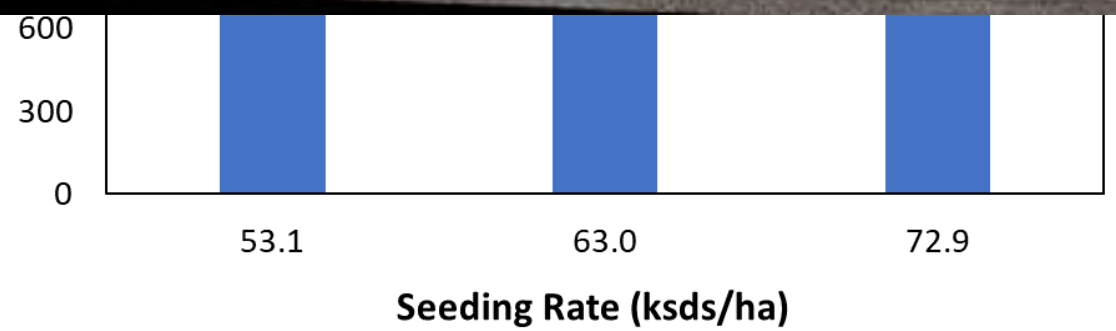
Plant Height & Nodes

Field 1





Yield



YIELD

Field 1

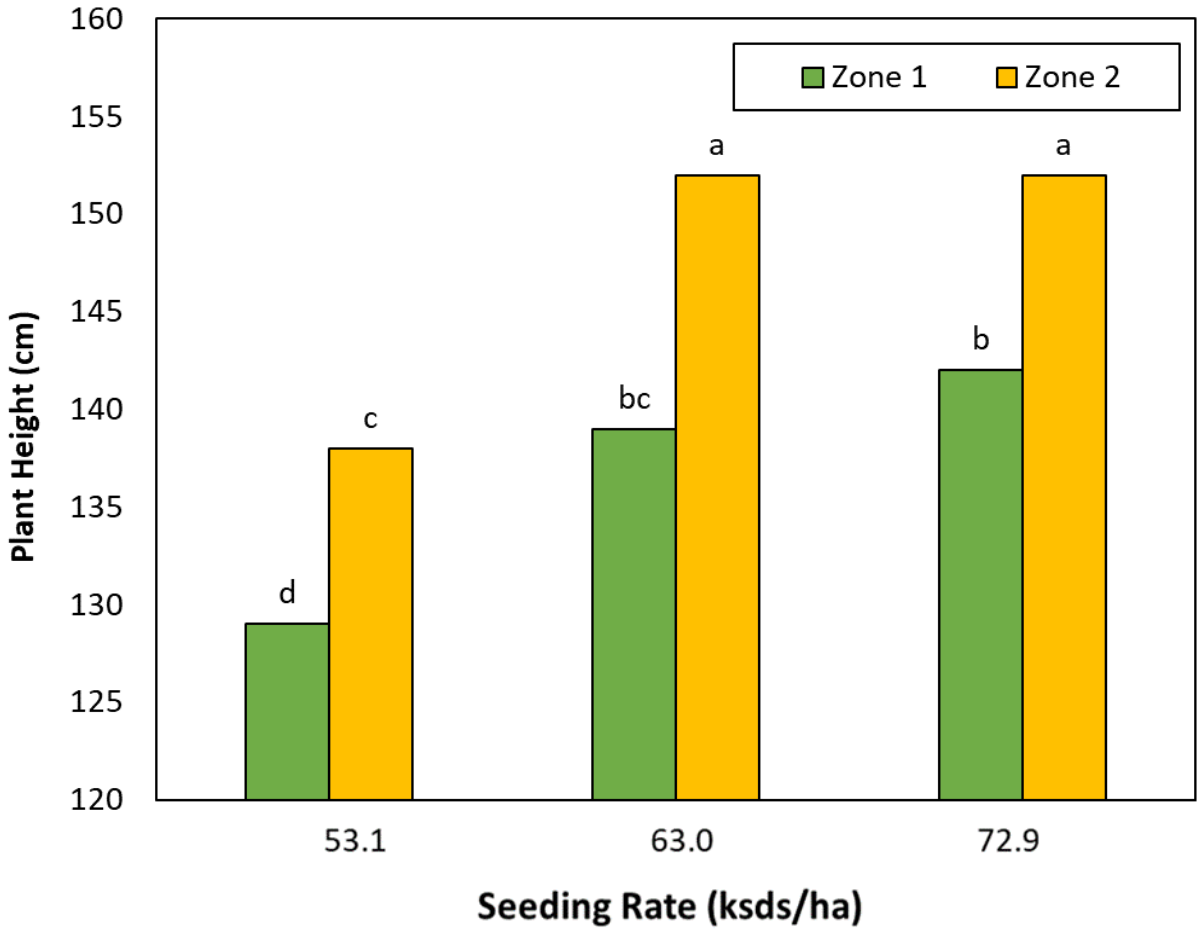
Results - Emergence

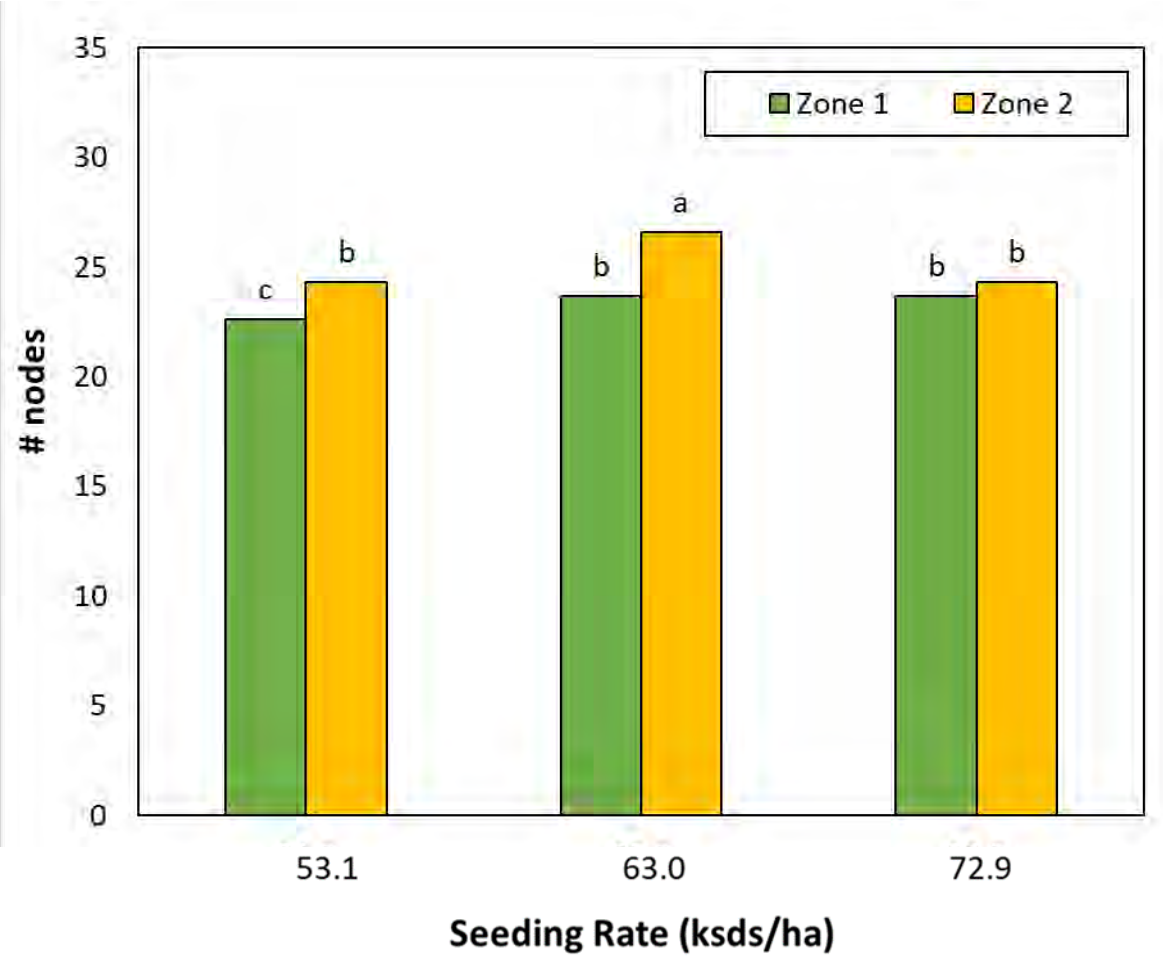
Field 2

Zone	Target Rate (ksds/ha)	Population (plants/ha)	Emergence (%)
1	53.1	40,994 e	77% bc
1	63.0	48,170 c	76% c
1	72.9	55,612 b	76% c
2	53.1	44,317 d	83% a
2	63.0	53,951 b	85% a
2	72.9	59,598 a	82% ab

Plant Height & Nodes

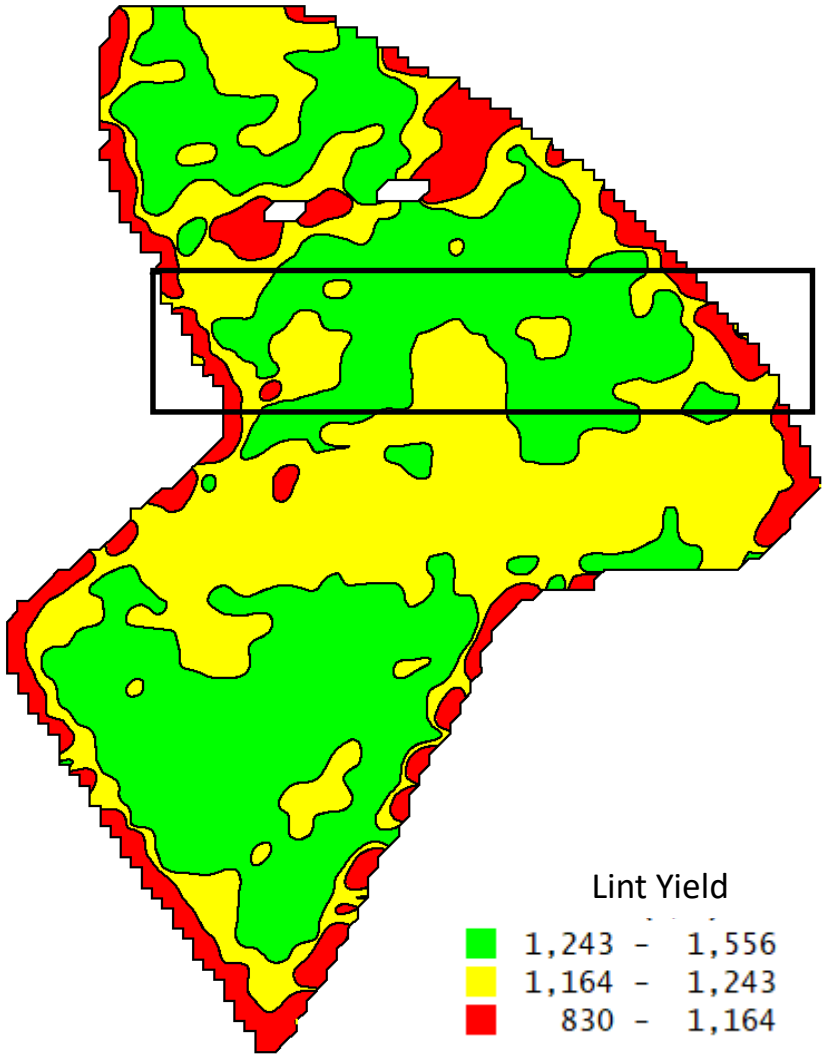
Field 2

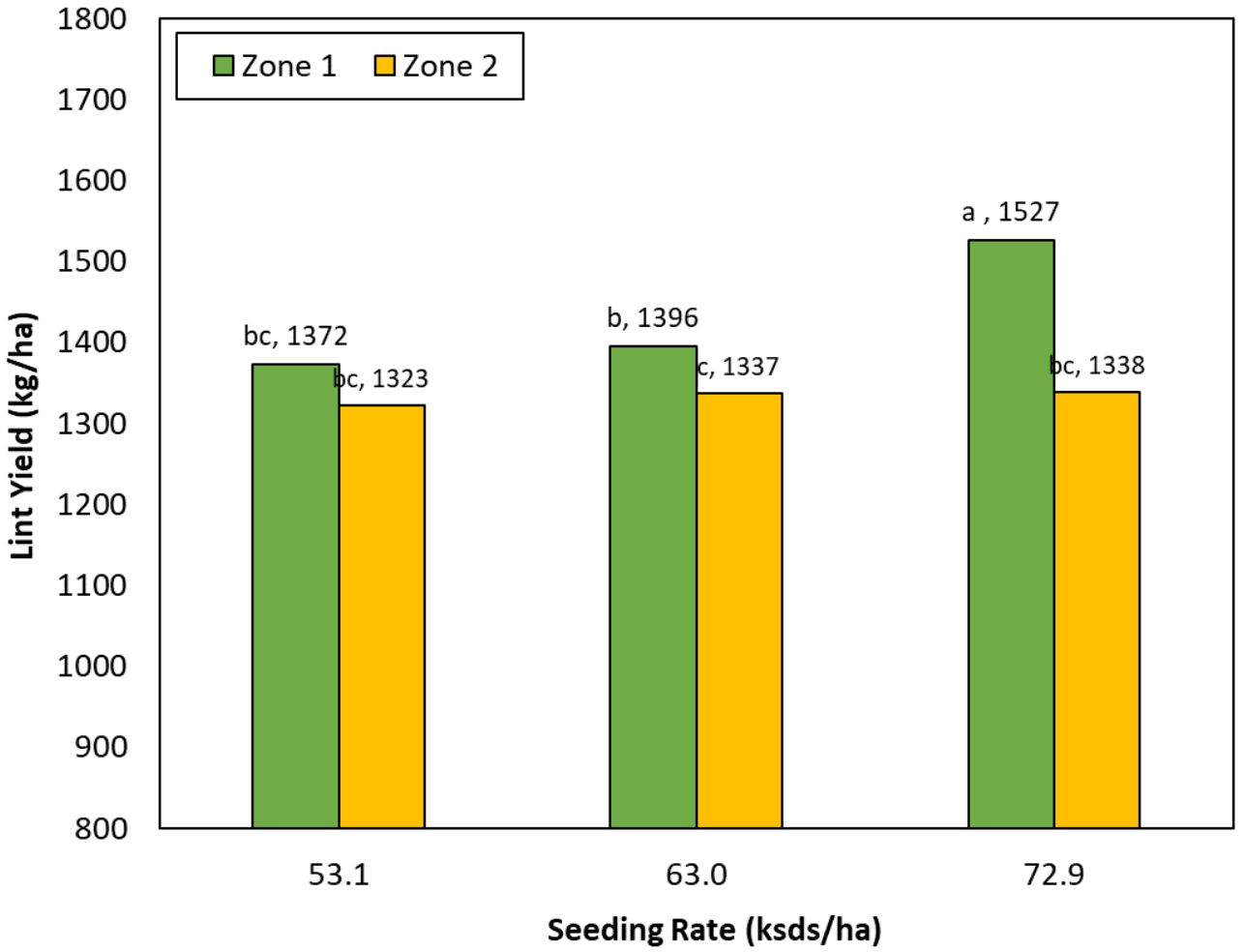




YIELD

Field 2





SUMMARY

- Seeding rate had an influence on plant growth in both fields. The lowest seeding rate resulted in less vegetative growth in both zone 1 and 2.

- In field 2, zone 1 had lower emergence, shorter plants, and yielded more than zone 2.

- There is a potential to reduce seeding rate from grower nominal without any yield impact in both fields.

Future Research:

- ❑ Evaluate the use of variable-rate seeding and variable-rate PGR applications by management zones for cotton production in the Southeastern US.

Thanks!

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