On-Farm Evaluation of Cotton Yield as Influenced by Management Zones

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Introduction

❑ Inherent spatial variability within the fields in the southeastern US creates management challenges (crop stand, growth and yield variability)

❑ Rising interest among growers in better management strategies to address crop growth and/or yield variability (e.g. managing seeding rate by field)
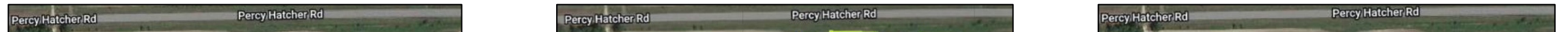
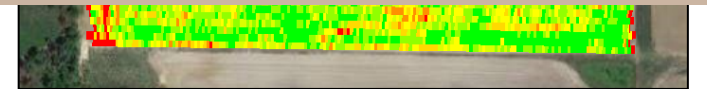*How does management zones influence cotton yield?*

Can seeding rate be adjusted by management zones within the field to improve productivity?

Bare Soil Imagery

In-season crop imagery

Yield Map

Hypothesis

Cotton yield can vary between management zones in a field. Seeding rate can be adjusted by management zone to maximize yield across the whole field.
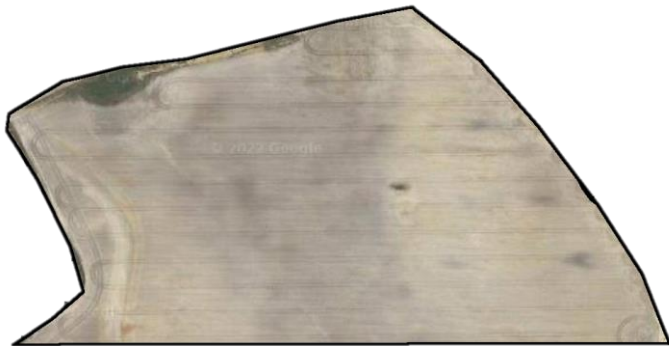
Objectives

1. Evaluate the influence of seeding rate by management zone on cotton yield

2. Investigate the potential of varying seeding rate (variable-rate seeding) by management zone

Study Locations

❖ **Field 1:** Miles Middle

- Dougherty Co, GA
- 30 acres
- Irrigated

❖ **Field 2:** Hatcher North
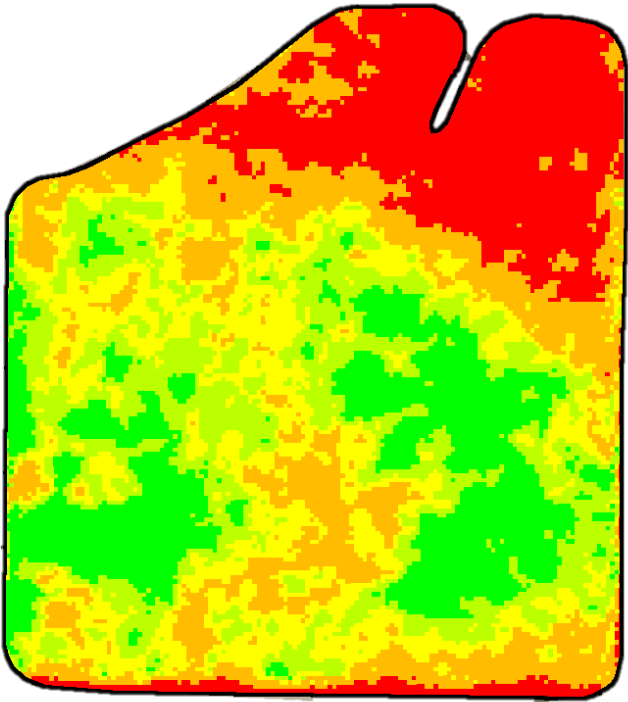
- Mitchell Co, GA
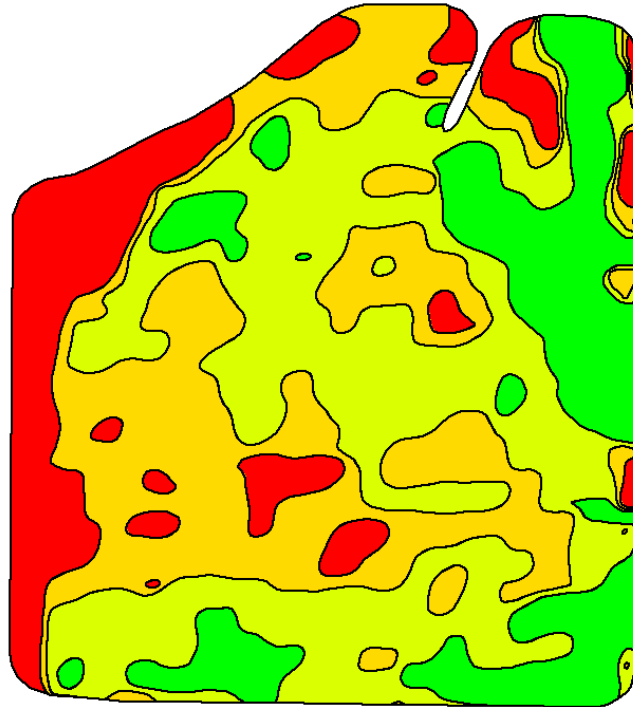- 44 acres
- Irrigated

❖ **Field 3:** Payne Reinke

- Colquitt Co, GA
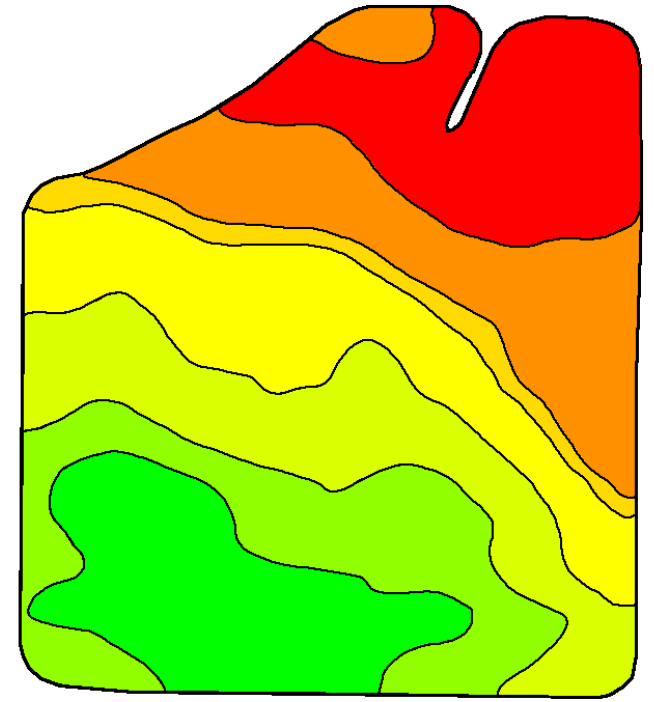- 22 acres
- Irrigated

Management Zone Delineation

Soil Color (Texture)

Yield or Crop Health Imagery

Elevation

Study Design

- Three Seeding Rates
  - 22.5 (ksds/ac)
  - 25.5 (ksds/ac)
  - 29.5 (ksds/ac)
    (Grower Nominal)

- Three replications and seeding rates randomized within each replication

- Each pass represented a seeding rate (1350 ft length)
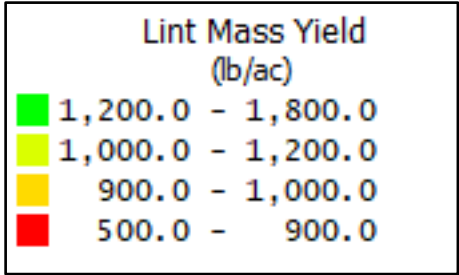
- Total 9 planter passes

12 row planter
36" row spacing
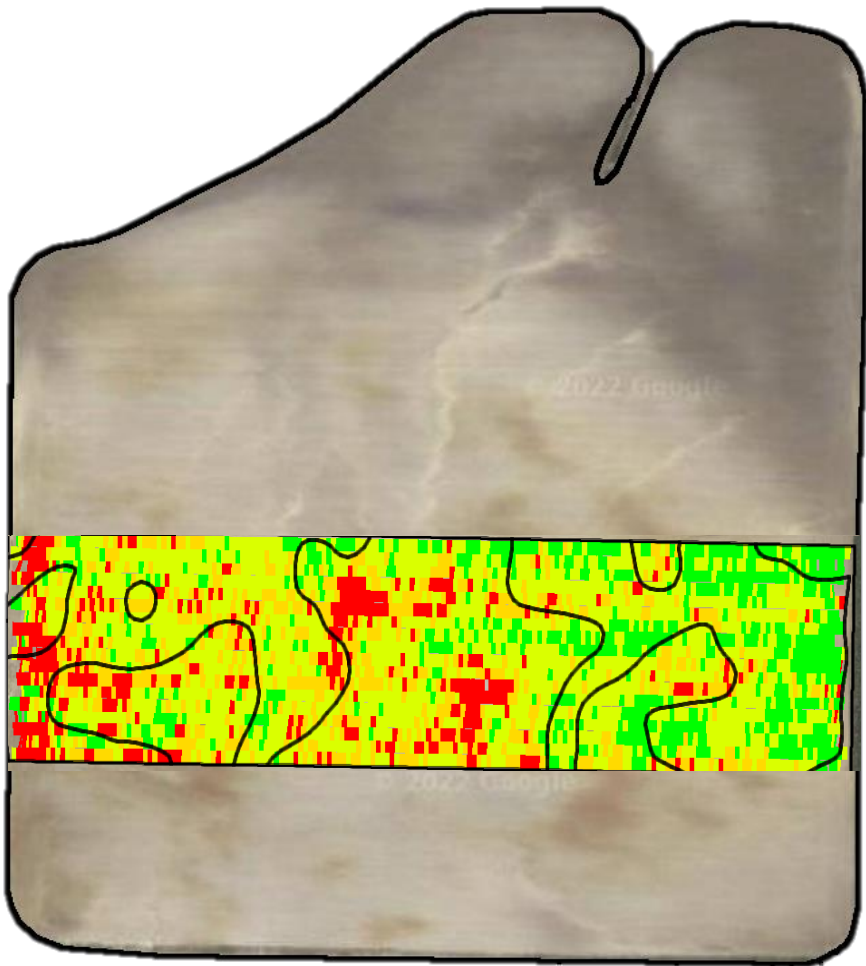

Seeding Rx

(ksds/ac)

🟩	29.5
🟨	25.5
🟥	22.5

Data Collection

Lint Mass Yield
(lb/ac)

|	
🟩	1,200.0 – 1,800.0
🟨	1,000.0 – 1,200.0
🟧	900.0 – 1,000.0
🟥	500.0 – 900.0

Data Analysis and GIS

- Yield was collected two different ways:
  - Each pass weighed separately using a calibrated platform scale
  - Yield map for the whole field using a yield monitor

- Yield for each pass was extracted from the map for analysis *(AgLeader SMS Advanced)*

- Further, yield was separated and extracted by zone within each pass

- Two-way ANOVA using JMP Pro 15 (α = 0.10)
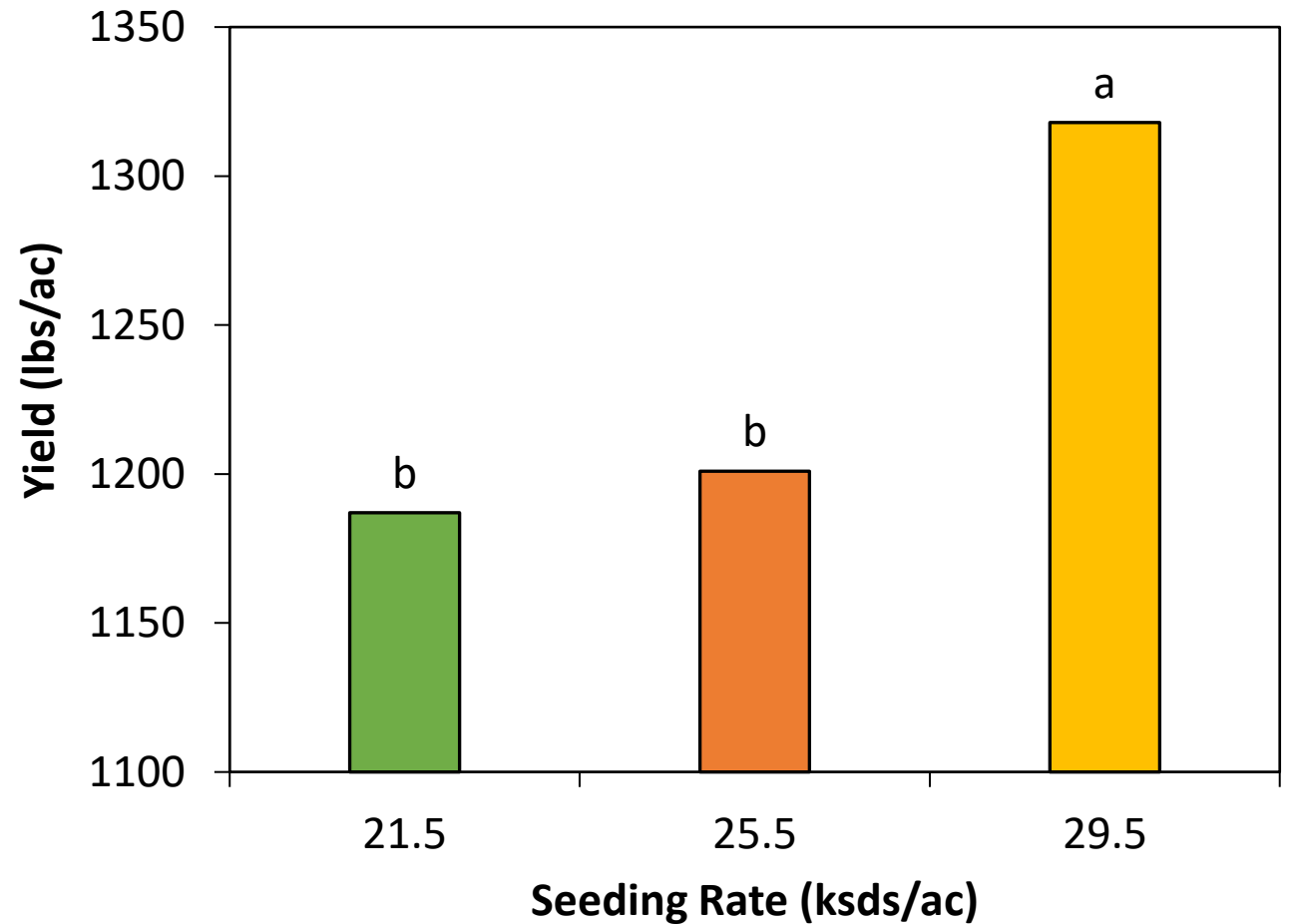
- Means comparison using a p $\leq$ 0.10
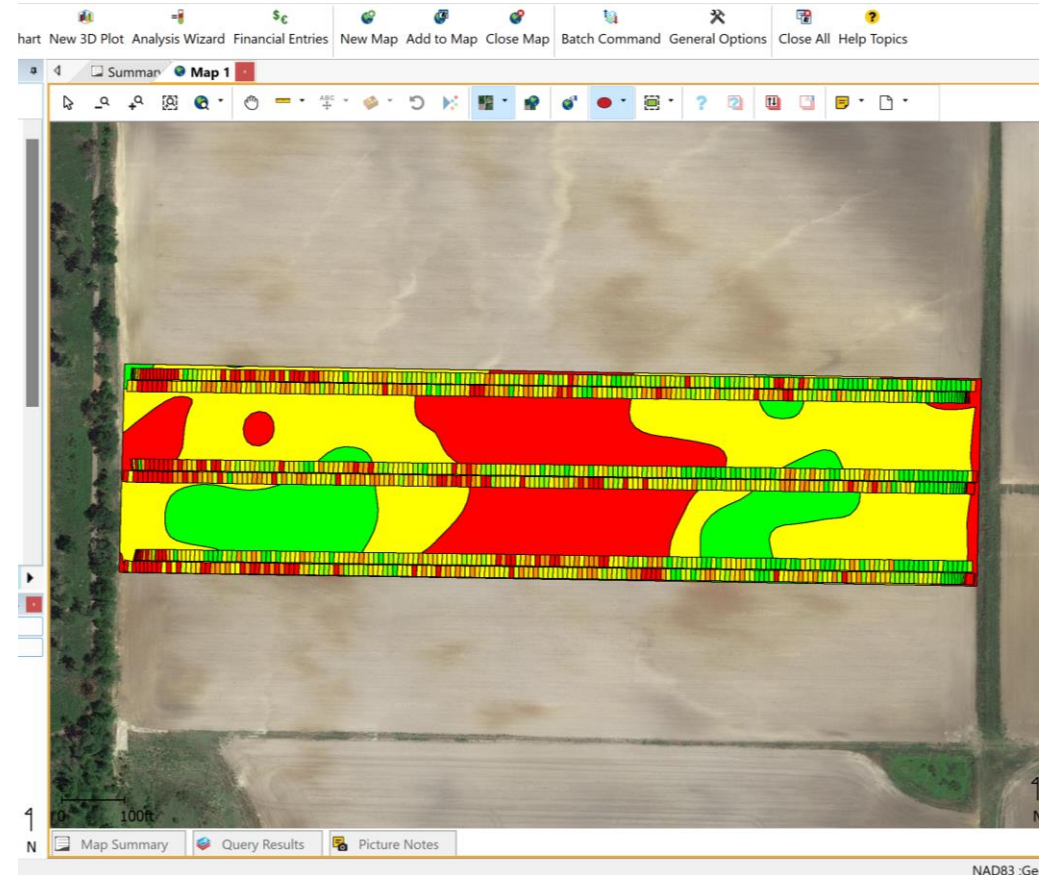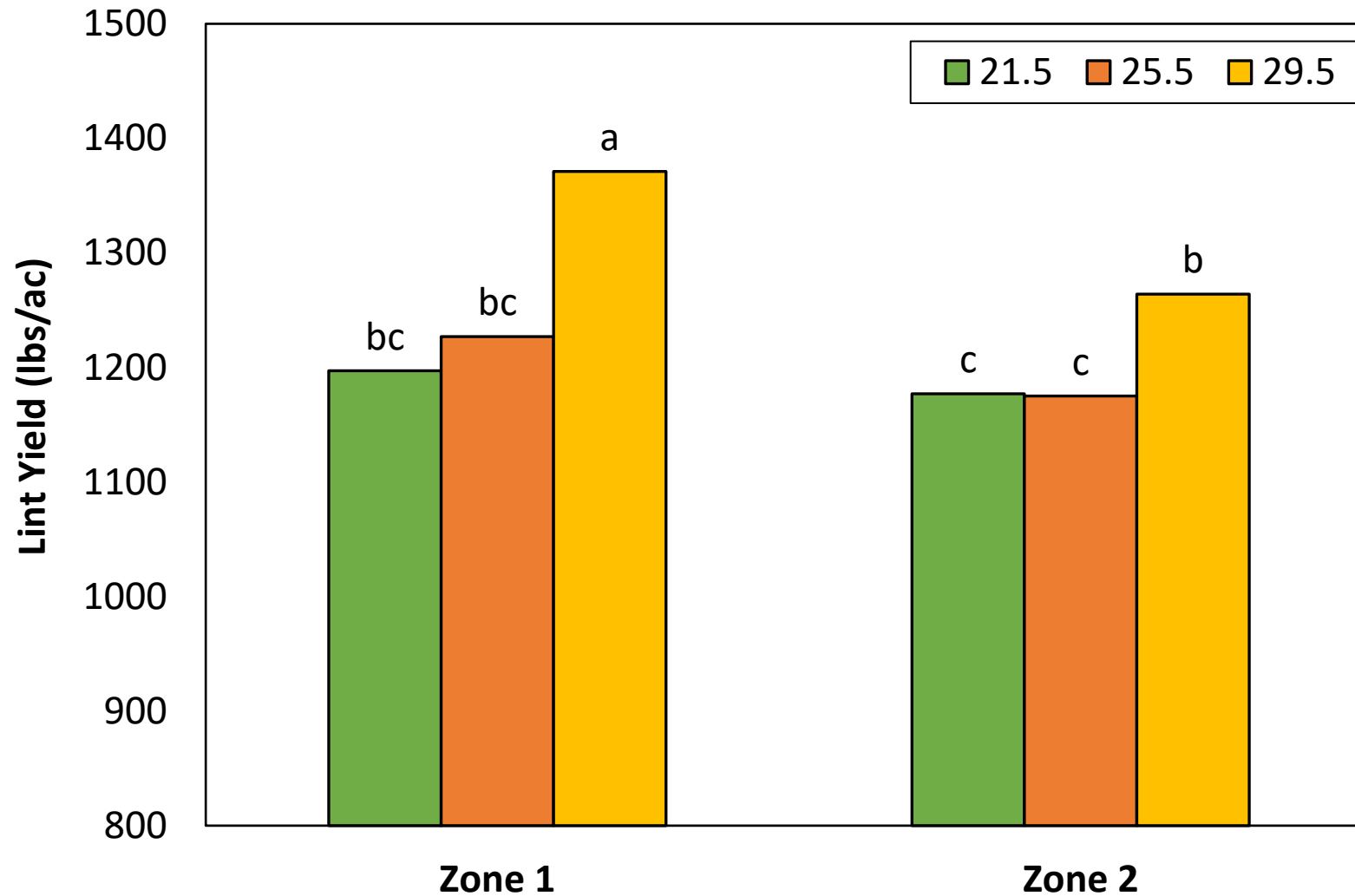
Results

Field 1: Yield by Seeding Rate

Seeding Rate (sds/ac)	Plant Population (plants/ac)	Emergence (%)
21,500	17,263, c	80
25,500	20,637, b	81
29,500	23,313, a	79

Means with same letters are not statistically different from each other (P>0.10).

Field 1 – Miles Middle
Yield by Management Zone

*Means with same letters are not statistically different from each other (P>0.10).

Field 2 – Hatcher
Yield by Seeding Rate

Seeding Rate (sds/ac)	Plant Population (plants/ac)	Emergence (%)
22,500	19,037, b	85
25,500	19,723, b	77
29,500	24,200, a	82

Means with same letters are not statistically different from each other (P>0.10).
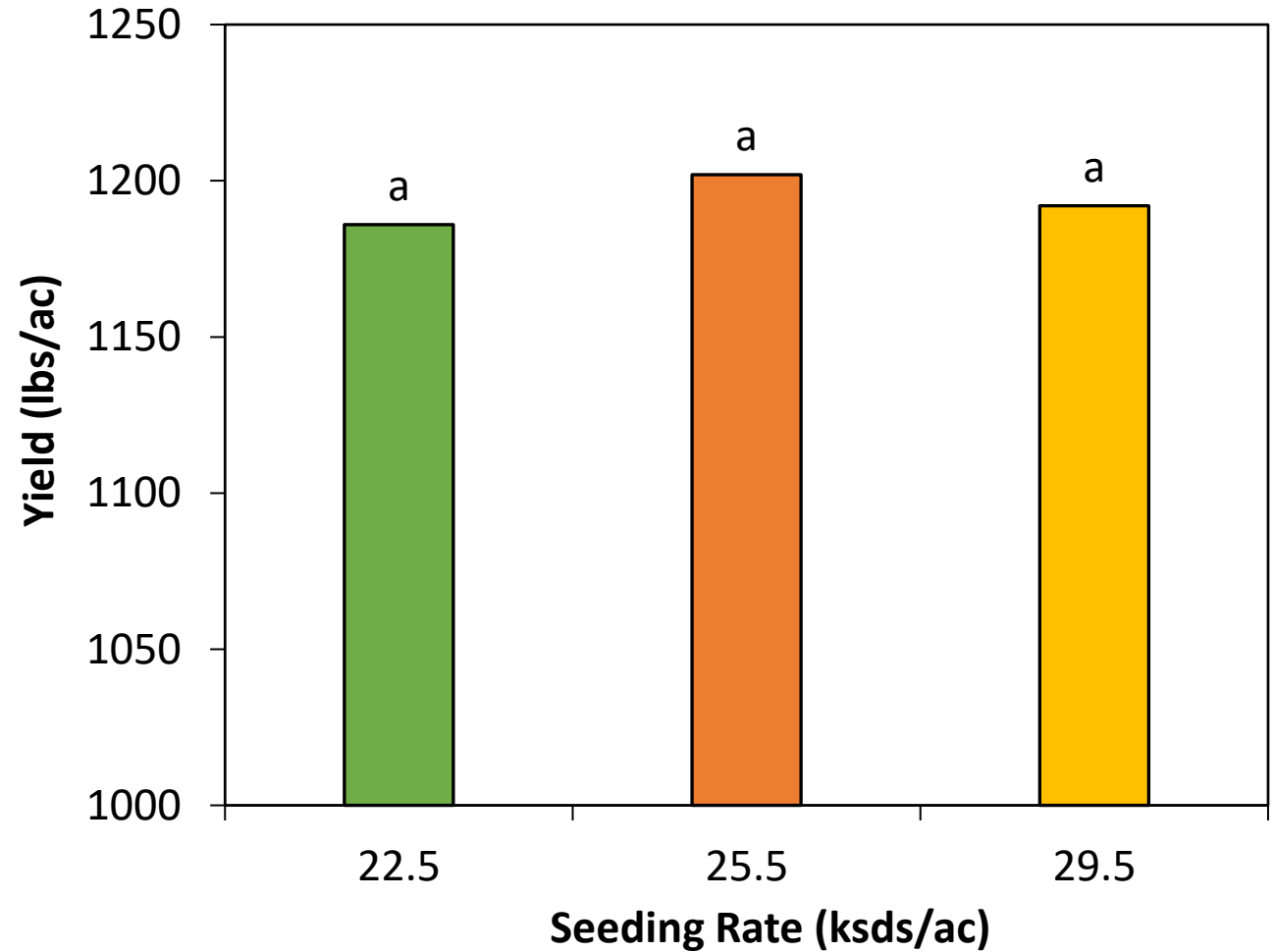
Field 2 – Hatcher
Yield by Management Zone

Means with same letters are not statistically different from each other (P>0.10).
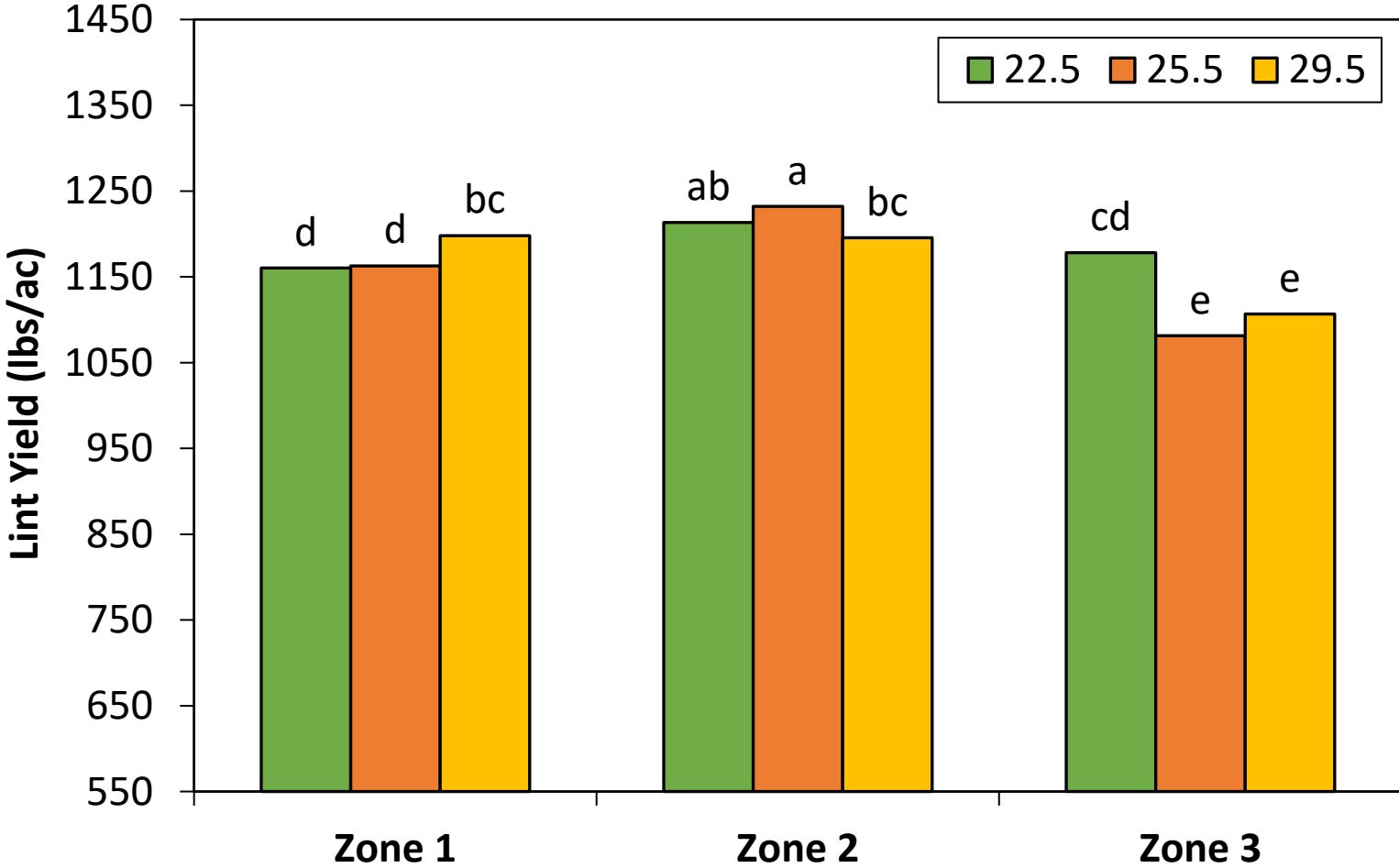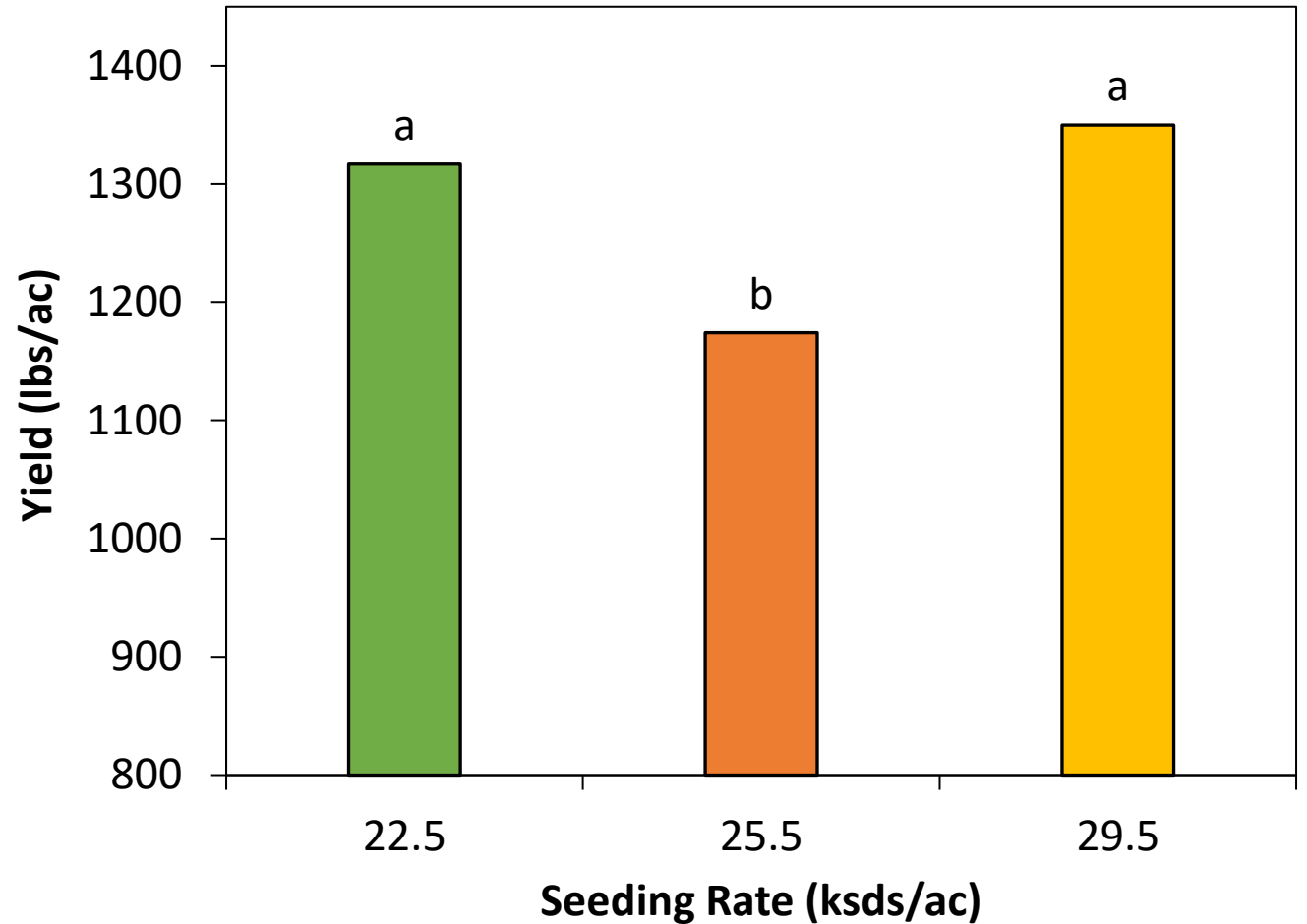
Field 3 – Payne
Yield by Seeding Rate

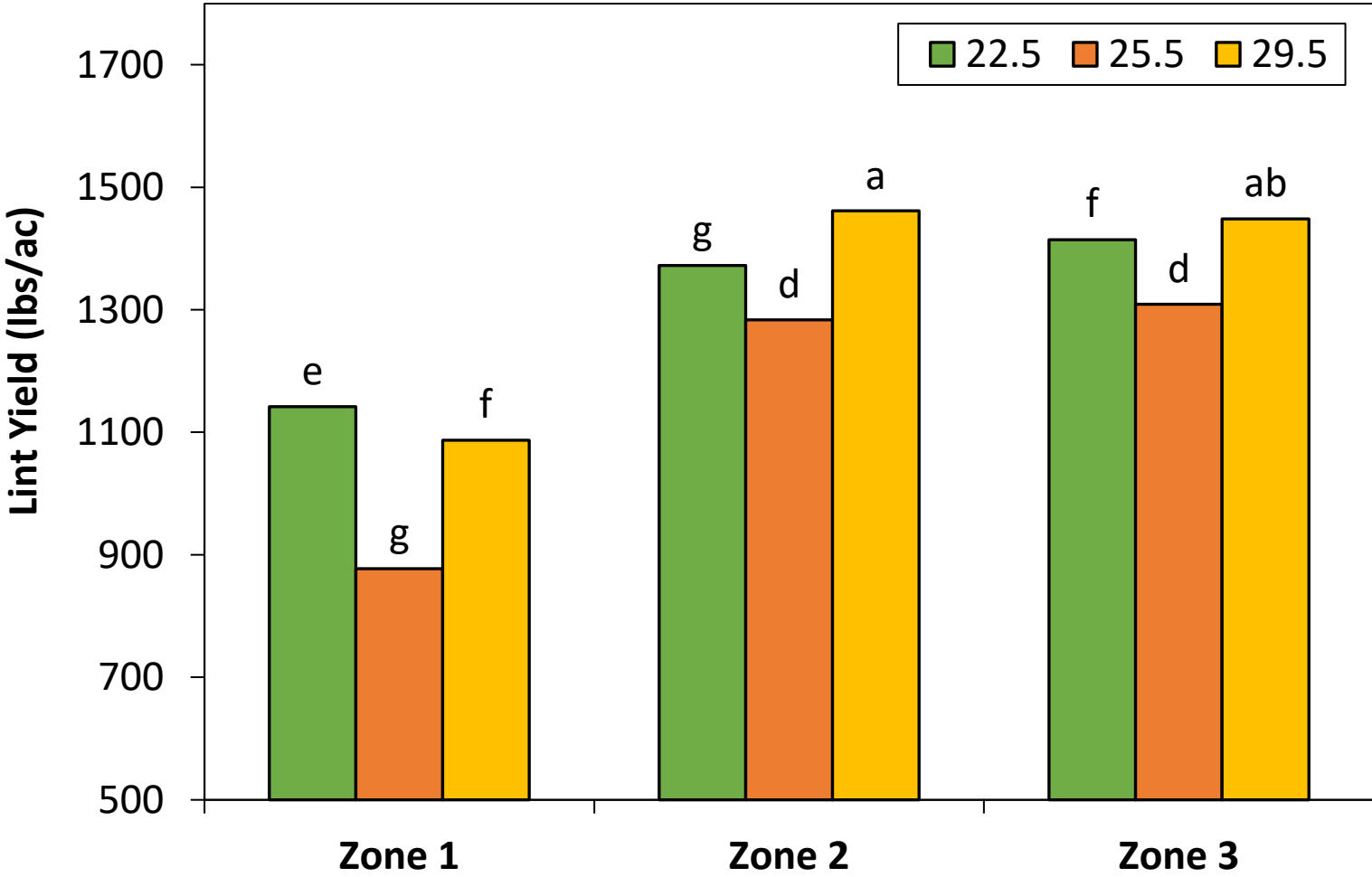| Seeding Rate (sds/ac)	Plant Population (plants/ac)	Emergence (%)
22,500	17,988, b	80
25,500	22,586, a	89
29,500	23,272, a	79

Means with same letters are not statistically different from each other (P>0.10).

Field 3 – Payne
Yield by Management Zone

*Means with same letters are not statistically different from each other (P>0.10).

Conclusions

❖ Management zones influenced cotton yield in all three fields. Yield response to seeding rate varied between the management zones (trend different than in the whole field).

❖ The study results showed that there is a potential to optimize seeding rate by management zone (variable-rate seeding).

❖ Seeding rate strips or checks would be recommended in each field before implementing any sort of VRS.

Future Work

➢ Compare and evaluate different ways to delineate management zones

➢ Measure success of VRS in these fields through yield and economical analysis

Thank You!

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