Field Performance of Two Different Planter Systems at Varying Ground Speeds in Corn

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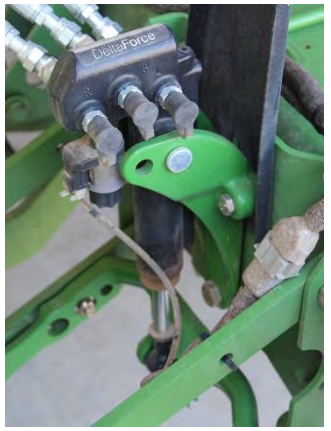
INTRODUCTION

- **High Speed Planting:** increased interest among growers to plant more acres especially during narrow planting windows
- **Traditional planting systems** when operated outside the recommended planting speed of 3 to 5 mph typically exhibit poor seeding performance
- **Poor field performance** results in uneven or poor stand establishment, which impacts corn yield.

Source: John Deere

Industry Trend & Grower Perception

- New technology options offered by ag equipment and technology companies to improve planter performance (seeding rate, seed spacing, seed depth)
- Recently, lot of growers have upgraded to electric seed meters and active downforce systems on their planters:
  - Can you plant at a higher than nominal speed with these systems?
  - If and how do these systems improve their planter field performance?



OBJECTIVE

Evaluate field performance of two different planter systems at (traditional and advanced) Varying ground speeds to determine how planting speed affects stand establishment and yield in corn

Site and Planting Information

Study Year: 2020

Location: Ponder Farms (Tifton, GA)

Soil Type: Tifton & Dothan Loamy Sand, 2 to 5 percent slopes

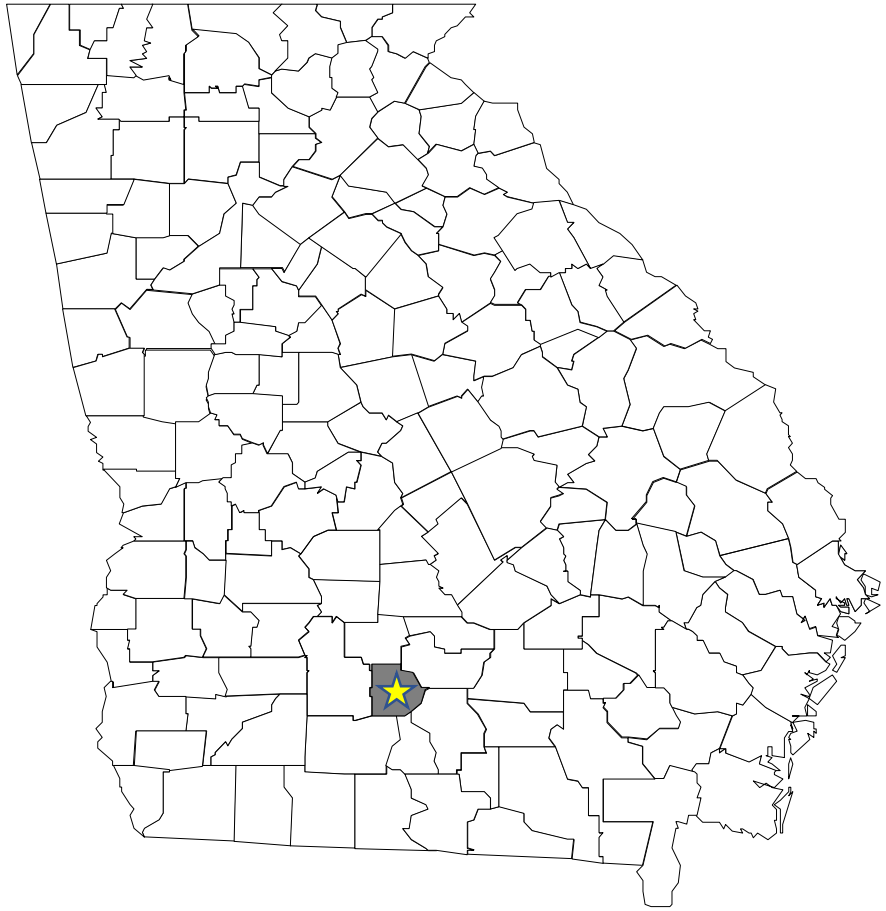
Field Conditions: Conventional, Irrigated

Variety: P1916YHR

Seeding Rate: 32,000 seeds/ac

Seeding Depth: 2 inches

Management: As per recommendations outlined in UGA Corn Production Guide



(UGA Tifton Campus, Tift County, Southwest GA)

Study Design and Layout

Treatments:

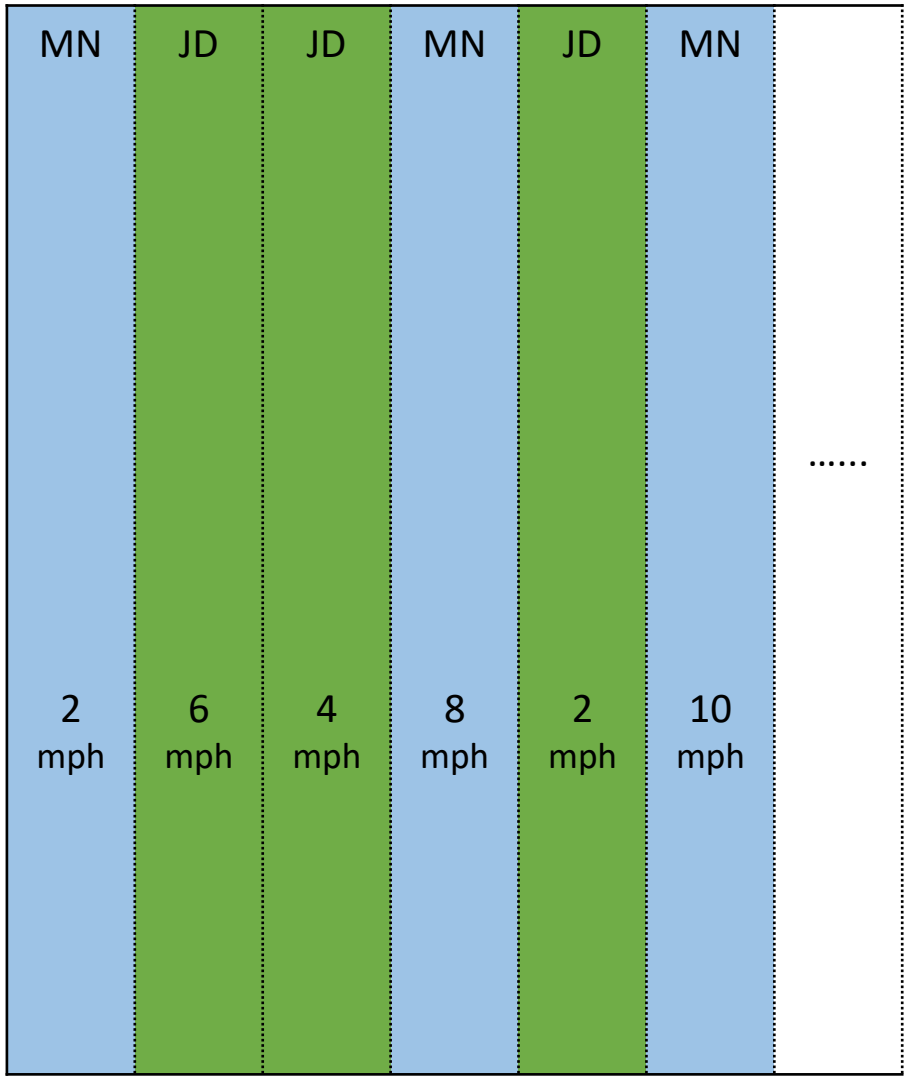
- Five ground speeds (2, 4, 6, 8 & 10 mph)

Two Different Planters:

- Monosem 4-row NG+ (MN)
- JD equipped with Precision planting technology (JD w/ PP)

Exp. Design & Layout:

- Strip-plot design
- Each pass/strip represented one planter and speed
- Passes randomized in the field
- 4 replications for each treatment



4-row Monosem NG+ Vacuum Planter

- ✓ Mechanically driven seed meters (ground driven)
- ✓ Mechanical Downforce system (adjustable springs)
- ✓ Standard gauge wheels (single wheel each side)
- ✓ Flat press wheel with disc closing system

4-row John Deere Max Emerge Plus

- ✓ Precision planting electric seed meter drives (vDrive & vSet)
- ✓ Active hydraulic downforce control (DeltaForce)
- ✓ Dual gauge wheels (two wheels stacked on each side)
- ✓ Two solid rubber wheels mounted opposite to each other

Data Collection & Analysis

Plot size: middle two rows (6 ft wide) by 40 ft long

Field data:

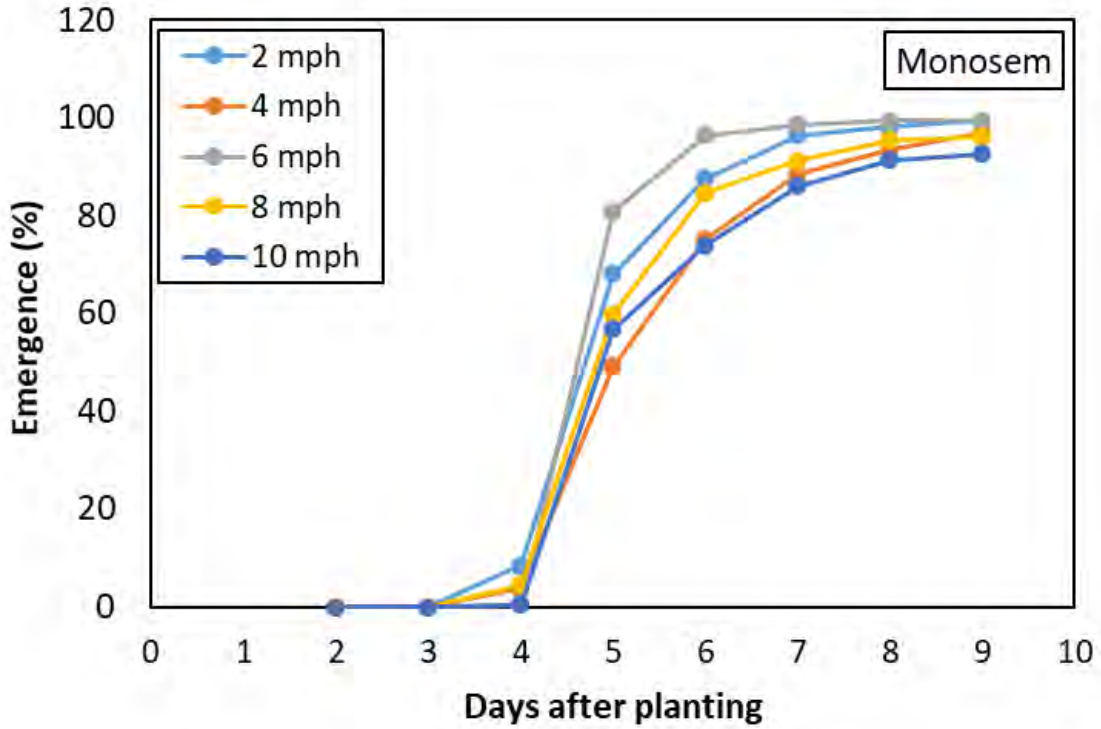
- Soil moisture measurements at planting
- Daily stand counts until full emergence
- Plant spacing (at V4-V6 stage)
- Seed depth (at V4-V6 stage)
- Yield at harvest

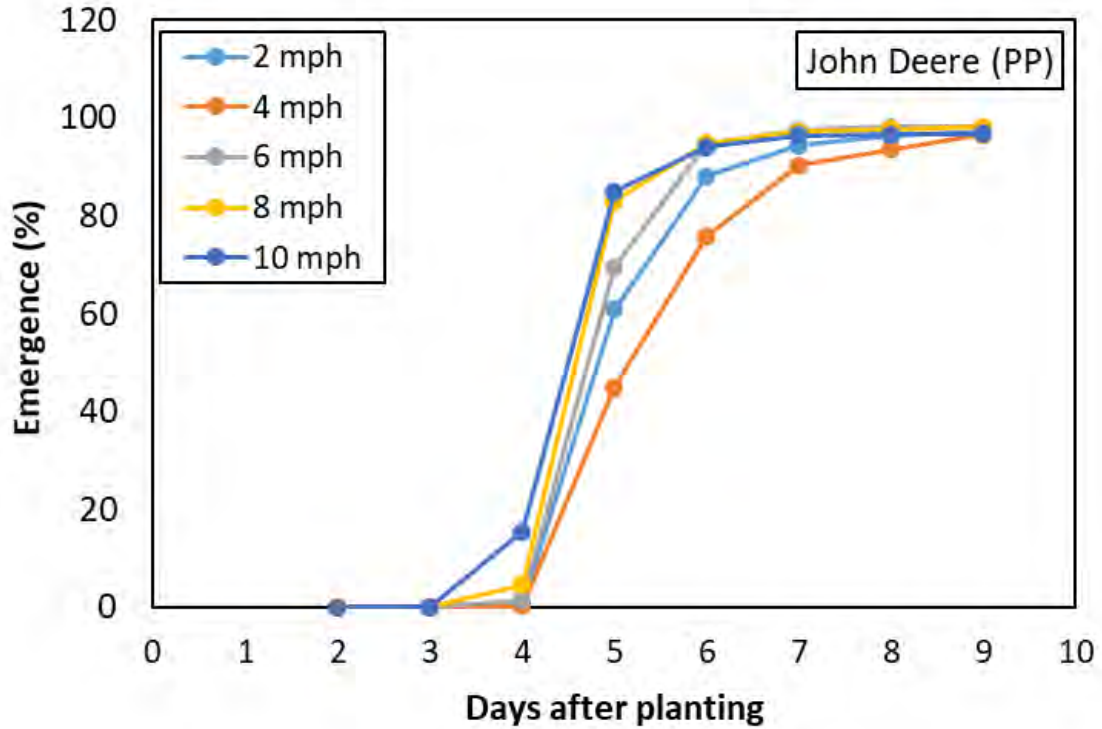
Data Analysis:

- Data analyzed separately for each planter
- Analysis of Variance and means comparison using $p<0.10$

RESULTS

Daily Emergence after planting

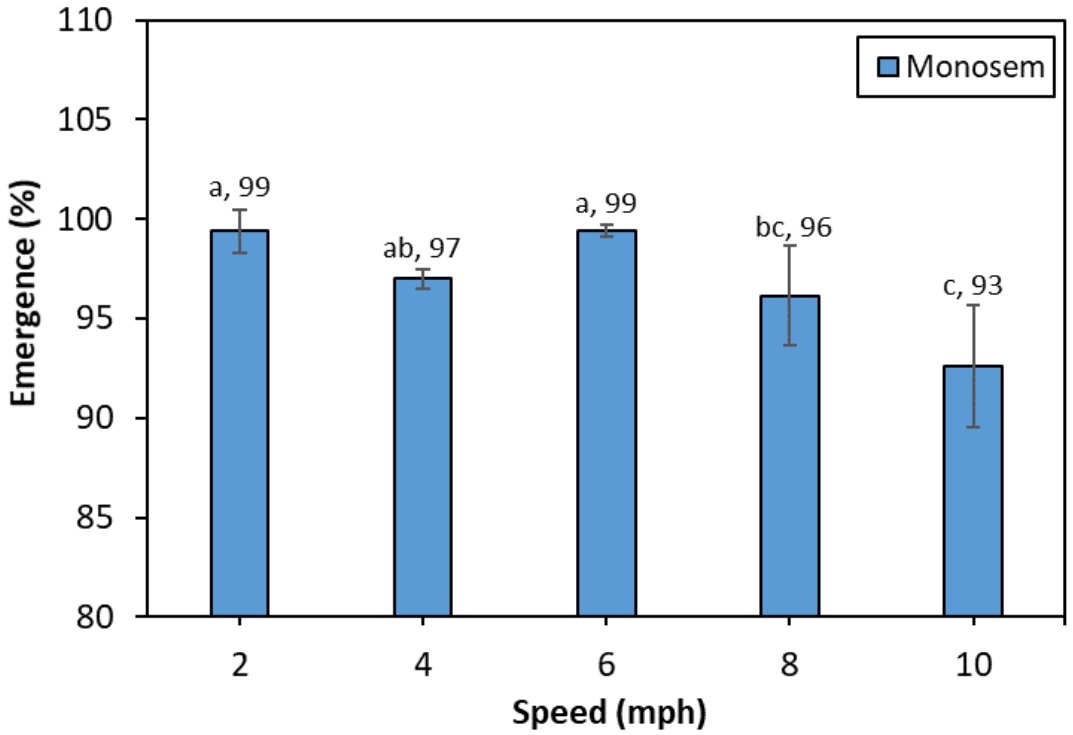




mean soil moisture = 8.7% (volumetric water content)

Crop Emergence

(Target Seeding Rate = 32,000 seeds/ac)



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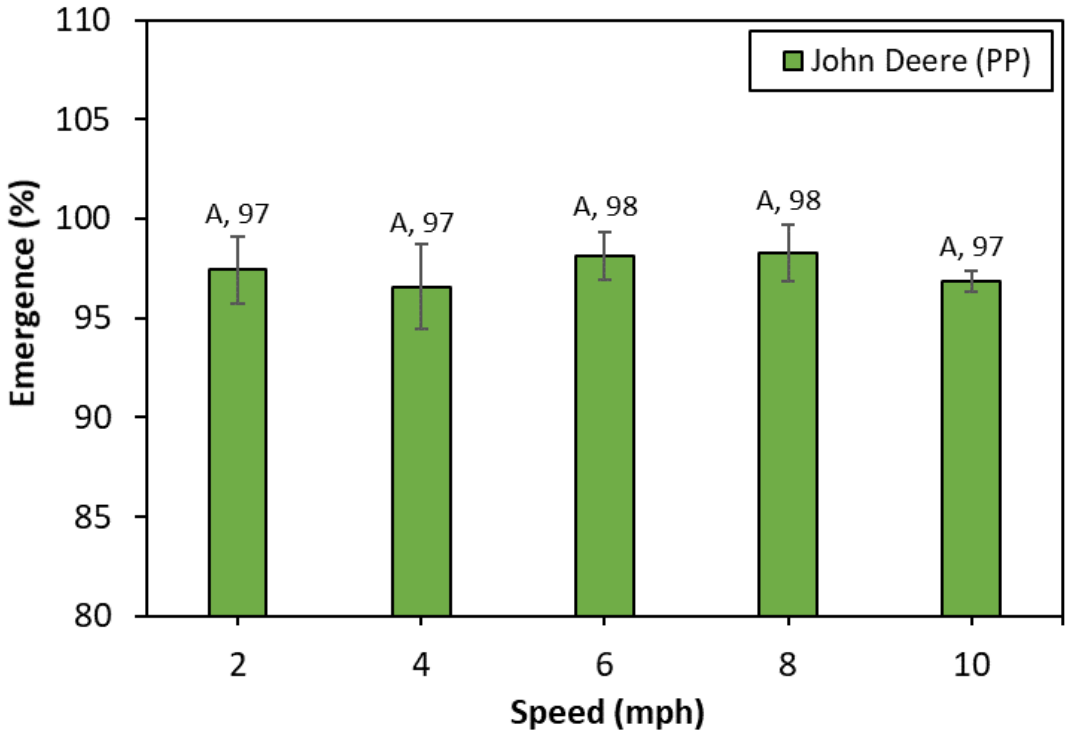

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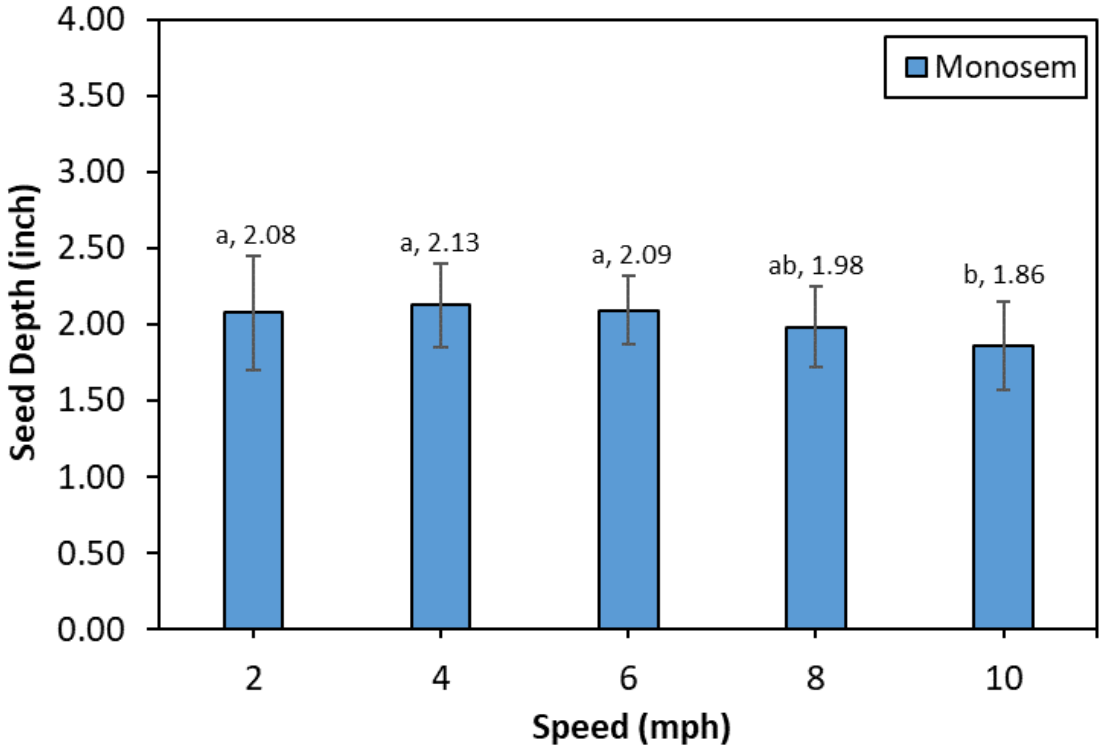
Seed Depth



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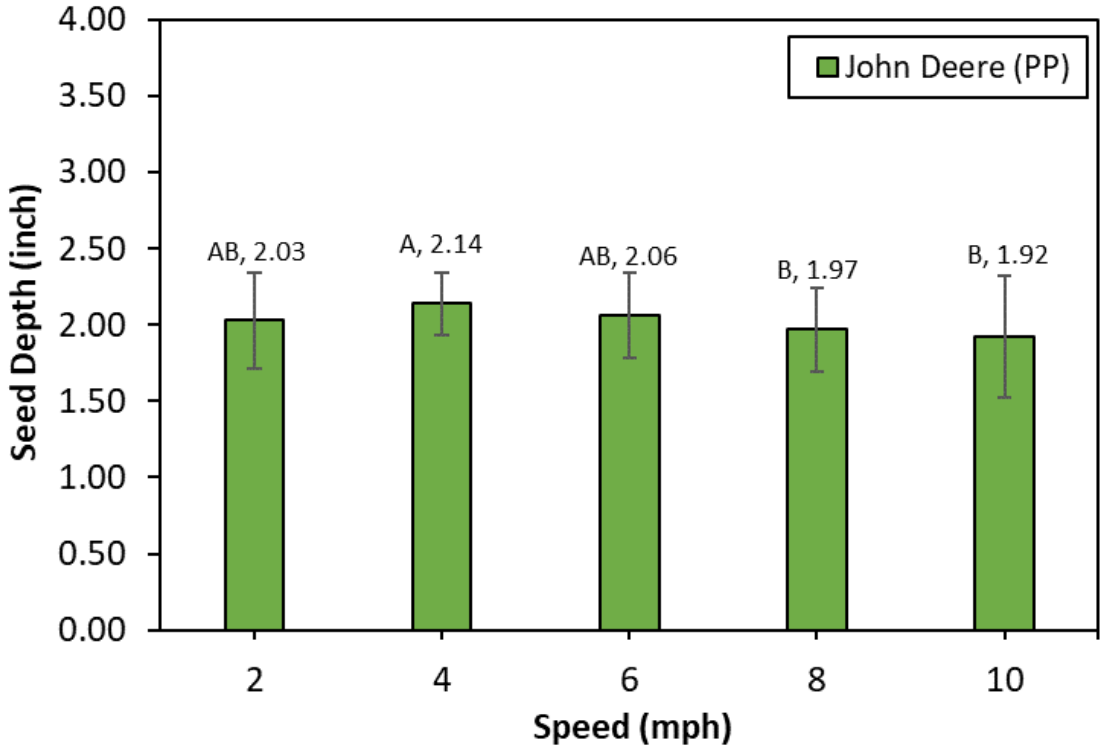

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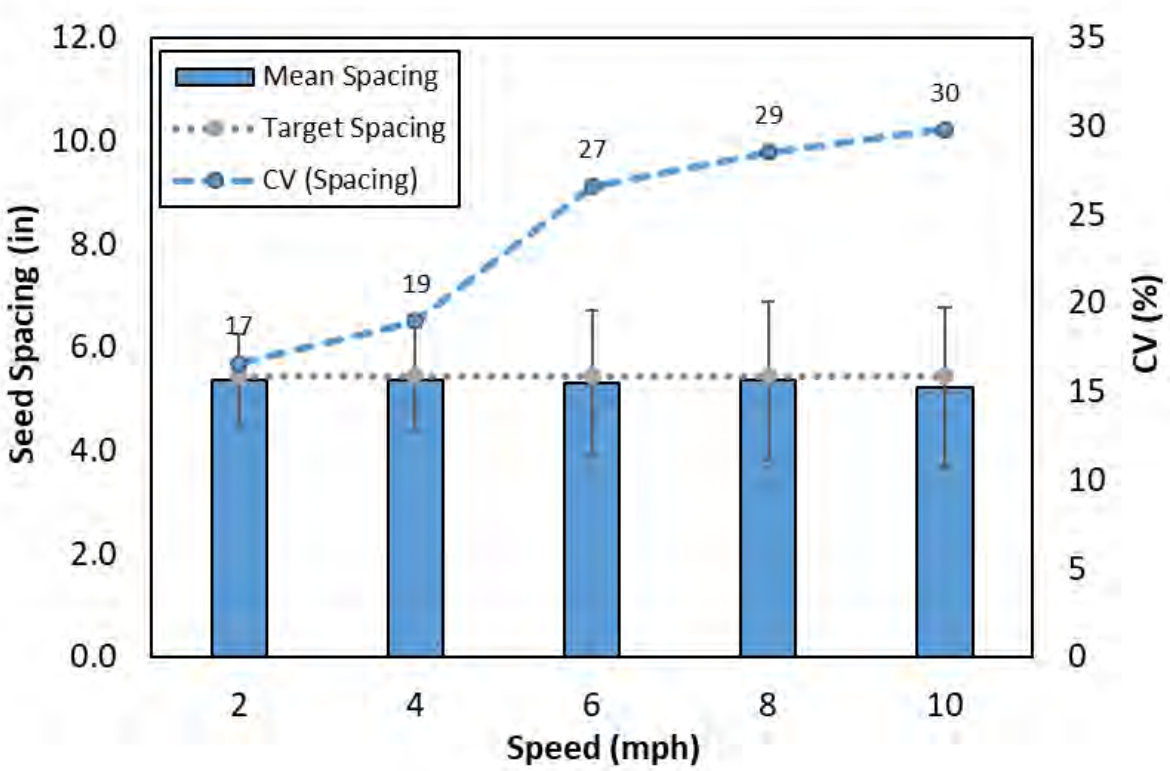
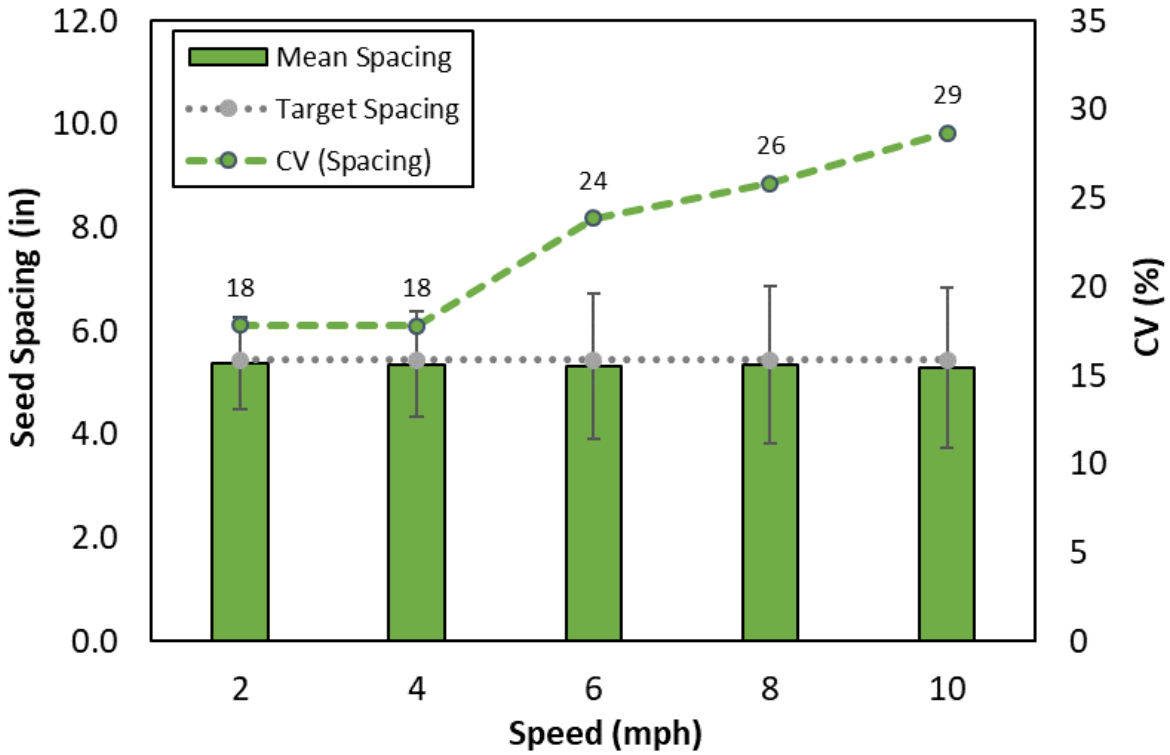
Seed Spacing

(Target Seeding Spacing = 5.45 inch)

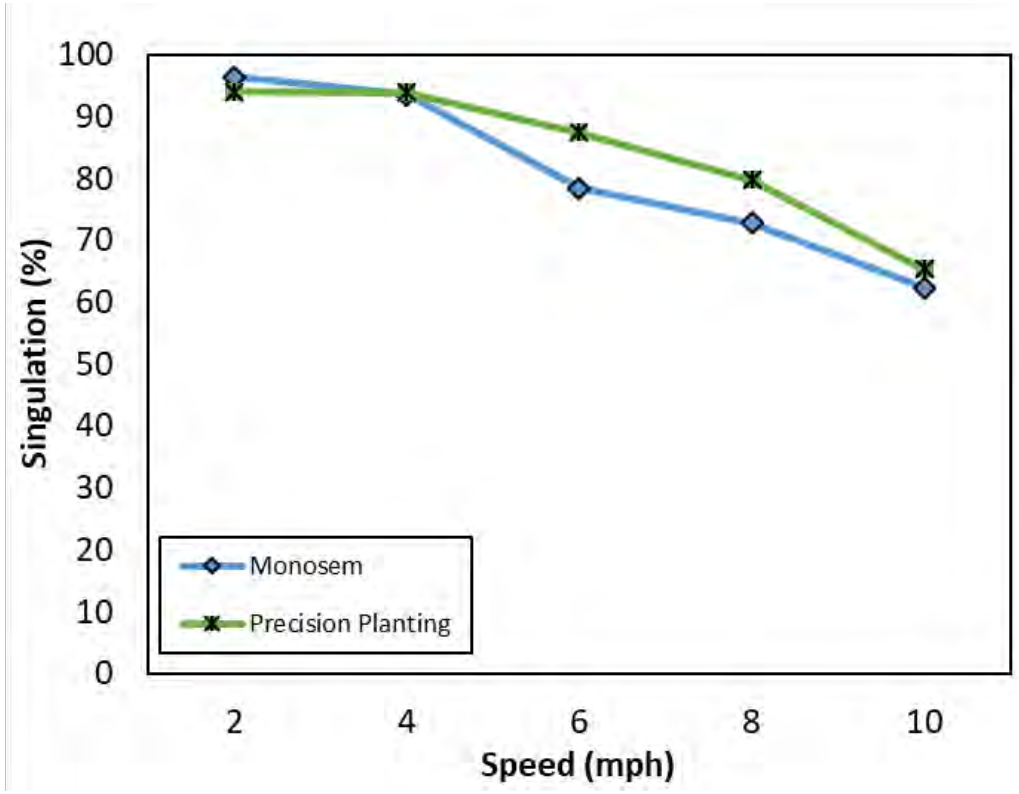


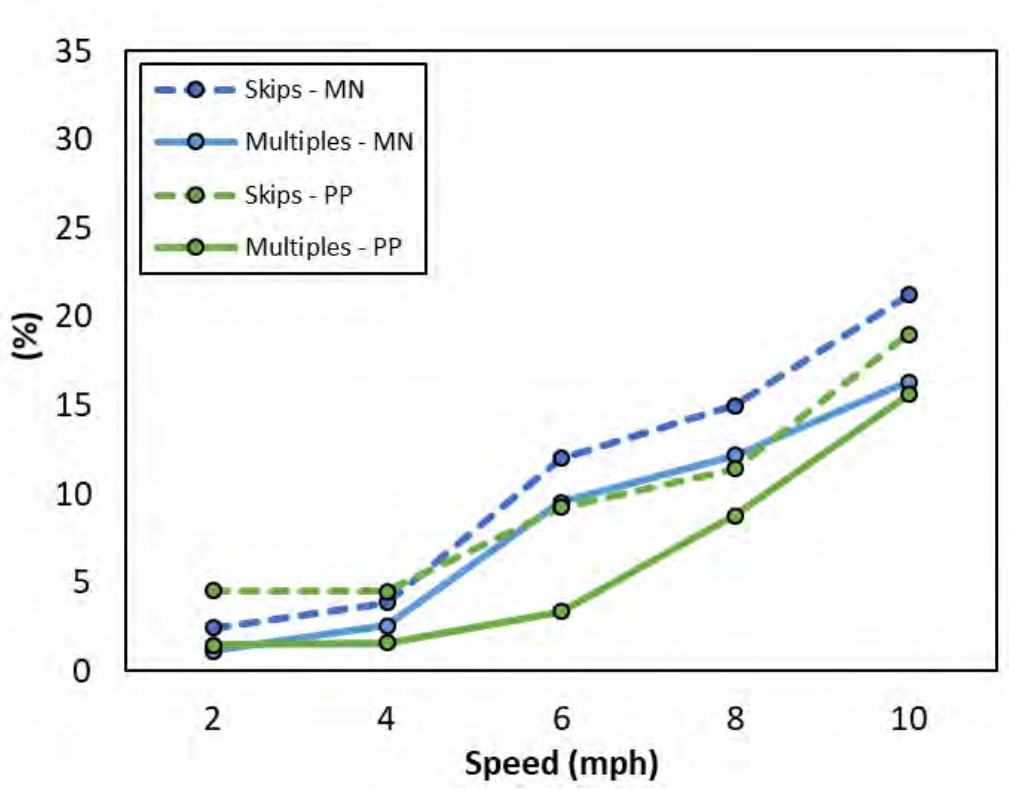


(CV represents the uniformity of seed spacing; CV ranges between 0 – 100)

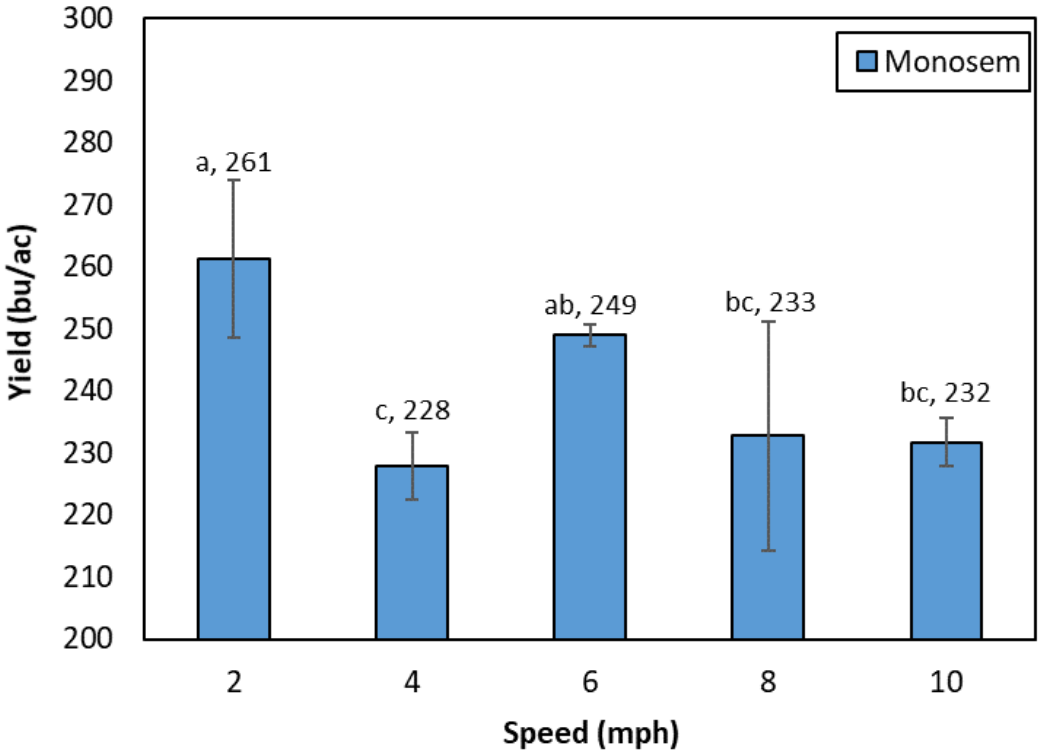
Seed Singulation

(computed from seed spacing measurements)





Corn Yield



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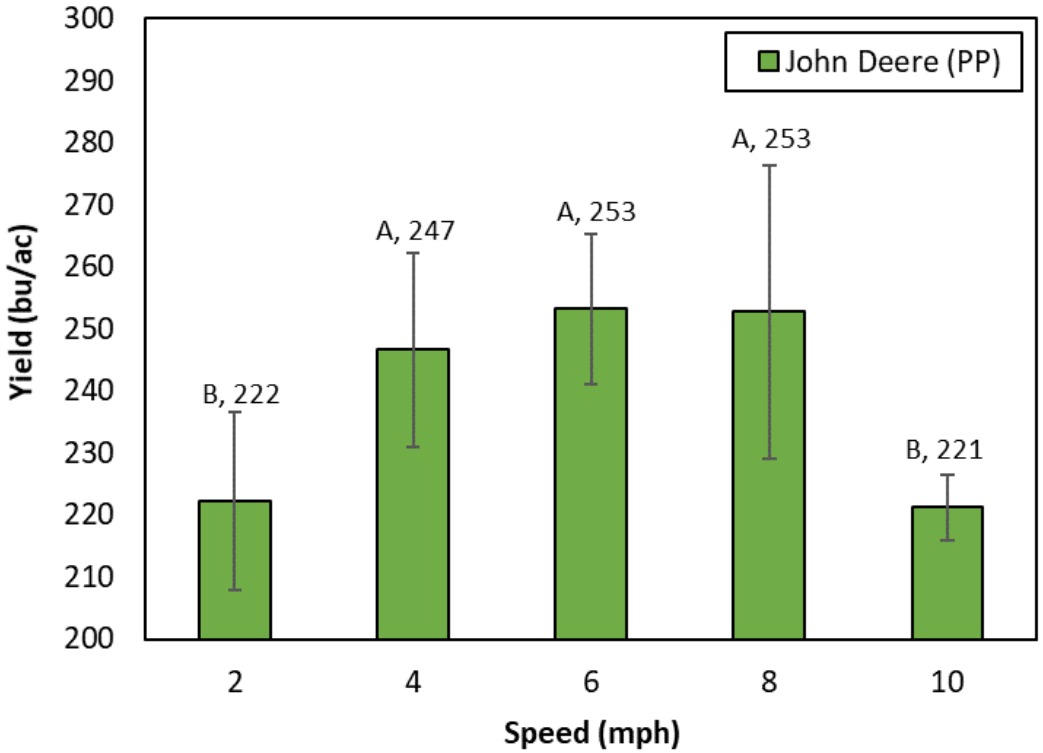

(p=0.0026)

SUMMARY

- **Stand Establishment:** Monosem planter - crop emergence reduced at 8 and 10 mph. John Deere (PP) - no effect of speed on emergence was observed for John Deere (PP). For both planters:
  - **Seed Depth:** Shallower planting depths at speeds above 6 mph
  - **Seed Spacing:** uniformity (CV) degraded considerably above 4 mph
  - **Singulation:** increased skips and multiples (mostly >5%) above 4 mph
- **Corn Yield:** Monosem planter – yield reduced at 8 and 10 mph but unexpectedly also at 4 mph. John Deere (PP) – reduced yield at 10 mph but also at the lowest speed of 2 mph

Conclusions

- Both planter systems tested in the study exhibited decrease in field performance at higher planting speeds

- Accurate seed delivery system is a critical requirement for high speed planting to ensure high seed singulation and uniform seed spacing

Future Research: Evaluating field performance of advanced planter systems equipped with precision seed delivery systems.

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Thanks!

(Please send any questions or comments to svirk@uga.edu)