Introduction

- High seed premiums and technology fees associated with new seed cultivars have increased variable planting costs incurred by growers.
- Many growers employ hill-drop seeding to ensure adequate stand establishment in unfavorable field conditions by planting additional seeds per hill.
- Past research suggests uniform stand establishment is more critical in maximizing yield potential than seeding rate (Wanjura, 1980; Siebert et al., 2006).
- Current planting technology offers precise seed metering and placement capabilities ensuring uniform stand establishment. Limited research exists on investigation of planting parameters in singulated and hill-drop planted cotton.

Hypothesis

Adequate planter downforce employed with correct selection of seeding rate and cultivar can provide comparable crop emergence and yield in singulated cotton as typically attained by planting additional seeds per hill in hill-dropped cotton.

Objectives

Evaluate the effects of planter downforce, seeding rate and cultivar on crop emergence and yield in cotton planted as singulated and hill-drop seeding configurations.

Material and Methods

Location: Gibbs Farm, University of Georgia, Tifton, GA (31.4362N, -83.5800W)

Planting Equipment:
Four-row Monosem NGPlus precision planter equipped with:

- Vacuum seed meters driven using a ground wheel drive
- Mechanical downforce system equipped with heavy-duty springs

Experimental Design:

Factorial arrangement of treatments implemented in strip-split design in plots that measured 12-ft (four rows) and 35-ft long. Treatments and levels listed below:

Table 1. P-values from ANOVA results for main and interaction effects for emergence and yield. Interactions not shown in the table were non-significant at p<0.05.

<table>
<thead>
<tr>
<th>Main and Interaction Effects</th>
<th>Emergence</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeding Configuration (SC)</td>
<td>0.1222</td>
<td>0.0906</td>
</tr>
<tr>
<td>Downforce (DF)</td>
<td>0.0063*</td>
<td>0.8768</td>
</tr>
<tr>
<td>Seeding Rate (SR)</td>
<td>0.0156*</td>
<td>0.01154*</td>
</tr>
<tr>
<td>Cultivar (CV)</td>
<td>0.0577</td>
<td>0.4214</td>
</tr>
<tr>
<td>SC x DF</td>
<td>0.0168*</td>
<td>0.6822</td>
</tr>
<tr>
<td>SC x SR</td>
<td>0.5625</td>
<td>0.8956</td>
</tr>
<tr>
<td>SC x CV</td>
<td>0.2327</td>
<td>0.4599</td>
</tr>
</tbody>
</table>

Results

Figure 1. Images showing crop emergence in the field for (A) singulated and (B) hill-drop (two seeds per hill) planted cotton. A non-uniform plant spacing can be observed in hill-drop planted cotton (B) compared to the uniform plant spacing attained in singulated cotton (A).

Figure 2. Crop emergence and lint yield obtained at different levels of (A & D) downforce, (B & E) seeding rate and (C & F) cultivar for singulated and hill-drop planted cotton. Bars represent mean values (n=4) and error bars represent two standard deviations. Bars with same letters indicate values that are not significantly different from each other. A seeding configuration x downforce interaction was noticed in Graph (A) as represented by all lower case letters.

Conclusions

- Crop emergence was reduced at a higher downforce in singulated cotton whereas no significant effect of downforce was observed on cotton yield in both seeding configurations.
- Singulated cotton exhibited comparable emergence and yield at both seeding rates while yield was reduced in hill-drop planted cotton at a lower seeding rate despite higher emergence.
- Cultivar effect on crop emergence and yield was similar in both singulated and hill-drop seeding configurations.
- Singulated cotton can be a viable cost-saving practice for growers currently employing hill-drop cotton to reduce seeding rates while sustaining their existing crop yields.

Future Research

Crop emergence and yield evaluation of singulated and hill-drop planted cotton in sub-optimal field conditions (crusted soils) and in different field tillage conditions.

References


Acknowledgements

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