Planter Performance

- Reach target **seeding rate**.
- Obtain **uniform seed spacing**.
- **Achieve adequate and uniform planting depth without compaction** - supports immediate germination and uniform emergence.

**QUESTION:** Can you EFFECTIVELY control each of these variables?
Producer Value
1) Identify and correct equipment issues immediately; 2) Execute prescriptions; 3) Identify soil characteristics (e.g. clods, trafficked areas)

Seed Depth = Downforce (DF)

Downforce is what helps us to maintain a uniform seeding depth
- TOO Much DF
  o Compaction
  o Seed placed too deep
- NOT Enough DF
  o Too shallow
  o Risk of seed depth variation

Considering texture and moisture variations, how do you maintain target depth?
Planter Row-Unit

Down Force Options

Mechanical Spring

Pneumatic

Hydraulic

Active Solutions

Toolbar (counterweight)

Active DownForce Technologies

• Soil physical properties vary spatially indicating planter performance could be improved by adjusting planter settings to field spatial variability.
• Seeding depth and downforce management are critical for optimization of planter performance (Hanna et al., 2010).
• Hydraulics provide quicker response and stability.

<table>
<thead>
<tr>
<th>Target Depth (in.)</th>
<th>Downforce TRTS</th>
<th>AVG Depth (in.)</th>
<th>CV Depth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>none</td>
<td>0 lbs.</td>
<td>1.84</td>
</tr>
<tr>
<td>2</td>
<td>optimal</td>
<td>100 lbs.</td>
<td>2.20</td>
</tr>
<tr>
<td>2</td>
<td>heavy</td>
<td>195 lbs.</td>
<td>2.28</td>
</tr>
</tbody>
</table>
Shallow Placement

Non-active Downforce

- 1.3” placement depth
- Increased depth CV by 13 points

Non-uniform Depth

Seeding Depth CV = 33.5%
2” Target with Active DF
(100 lbs with active downforce)
Uniform Spacing and Emergence

2” Target with Mechanical Springs
(nominal 125 lbs)
Non-Uniform Spacing and Emergence

Uniform Depth Placement @ Target Depth

• Seed Depth CV = 4% to 8% with active downforce
• 8% increase in Seed Depth CV without active downforce
• 10 bu/ac gain for good seed-to-soil contact
  - Need additional DF margin in dry years
  - Less DF margin in wet years