EFFECTS OF CONVEYOR AND GROUND SPEED

Objectives

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Virginia</td>
<td>Runner + Virginia</td>
</tr>
<tr>
<td>Conveyor speeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80%</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>90%</td>
<td>85%</td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>110%</td>
<td>115%</td>
<td></td>
</tr>
<tr>
<td>120%</td>
<td>130%</td>
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</tr>
<tr>
<td>Ground speeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 mph</td>
<td>1.5 mph</td>
<td></td>
</tr>
<tr>
<td>3 mph</td>
<td>2.5 mph</td>
<td></td>
</tr>
<tr>
<td>4 mph</td>
<td>3.5 mph</td>
<td></td>
</tr>
<tr>
<td>5 mph</td>
<td>4.5 mph</td>
<td></td>
</tr>
</tbody>
</table>

Diggers used in study

2017 site description

KMC
8.5 ac
Soil MC = 8.5% ± 3%
% Sand = 85% ± 7%

Amadas
6.3 ac
Soil MC = 5.7% ± 2%
% Sand = 91% ± 6%

2017 site description

KMC
Amadas
CONVEYOR SPEED TESTS

 Conveyor speed: Literature

- Amadas
  - Set conveyor to match tractor speed (digital readout)
  - Excessive dirt in windrow = Conveyor too slow?
  - Conveyor stalls excessively = Conveyor too slow?

- KMC
  - Vine flow synchronized with ground speed and conveyor speed

- Bader, UGA
  - Chain speed slightly faster than forward speed to avoid pileup of vines ahead of pickup

- Roberson, NCSU
  - Synchronize to avoid dragging and snatching of plants
  - Optimum shaker speed is slightly faster than ground speed

Setting conveyor speed visually

- Conveyor lagging
- Conveyor leading

Travel Direction

Conveyor speed tests: Ground speed was 2.5 mph

- Runner
  - Conveyor Speeds: 70%, 85%, 100%, 115%, 130%

- Virginia
  - Yield, lb/ac (@ 10%MC)
  - Conveyor Speed, %

Amadas conveyor speed tests

- Runner
  - Bars A, B, C, D
  - Yields at different conveyor speeds

- Virginia
  - Bars A, B, C
  - Yields at different conveyor speeds
Amadas conveyor speed tests

2016 Virginia

Amadas conveyor speed tests

2017 Virginia

KMC conveyor speed tests

2016 Virginia

KMC conveyor speed tests

2017 Virginia

GROUND SPEED TESTS

Ground speed: Literature

- Amadas: “Starting speed” 2.5 – 3 mph
- KMC: 3 – 3.5 mph
  - Too fast causes bunching
  - Too slow pulls vines apart, pulling off peanuts
- Bader, UGA: 3.5 – 5 mph
- Roberson, NCSU
  - Heavy pod losses at ground speeds in excess of 4 mph

Ground Speed Tests: Conveyor Speed = Ground Speed

Ground Speeds
- 4.5 mph
- 3.5 mph
- 2.5 mph
- 1.5 mph
2016 Amadas digging losses vs. GndSpd: Virginia type

Slope = 232 lb/ac loss per mph above 3 mph

2017 Amadas yield vs. GndSpd: Virginia type

Slope = 240 lb/ac loss per mph above 1.5 mph

2016 KMC digging losses vs. GndSpd: Virginia Type

Slope = 274 lb/ac loss per mph above 2 mph

2017 KMC yield vs. GndSpd: Virginia Type

Slope = 160 lb/ac loss per mph above 1.5 mph

2017 KMC yield vs. GndSpd: Runner Type

Slope = 230 lb/ac loss per mph above 2.5 mph

Field Capacity for Various Digging Speeds

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Capacity (ac/hr)</th>
<th>Time (hr/10 ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2.6</td>
<td>3.8</td>
</tr>
<tr>
<td>2.5</td>
<td>3.3</td>
<td>3.1</td>
</tr>
<tr>
<td>3</td>
<td>3.9</td>
<td>3.1</td>
</tr>
<tr>
<td>3.5</td>
<td>4.6</td>
<td>2.2</td>
</tr>
<tr>
<td>4</td>
<td>5.2</td>
<td>1.9</td>
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<td>5.9</td>
<td>1.7</td>
</tr>
<tr>
<td>5</td>
<td>6.5</td>
<td>1.5</td>
</tr>
</tbody>
</table>

4-Row Diggers

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Capacity (ac/hr)</th>
<th>Time (hr/10 ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2.6</td>
<td>3.8</td>
</tr>
<tr>
<td>2.5</td>
<td>4.9</td>
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</tr>
<tr>
<td>3</td>
<td>5.9</td>
<td>1.7</td>
</tr>
<tr>
<td>3.5</td>
<td>6.9</td>
<td>1.5</td>
</tr>
<tr>
<td>4</td>
<td>7.8</td>
<td>1.3</td>
</tr>
<tr>
<td>4.5</td>
<td>8.8</td>
<td>1.1</td>
</tr>
<tr>
<td>5</td>
<td>9.8</td>
<td>1.0</td>
</tr>
</tbody>
</table>

6-Row Diggers
Digger Operation Conclusions

- Best to lag conveyor speed in heavier vines (Virginia type)
- Perhaps match conveyor speed in lighter vines (runner type)
- Yield losses increase with ground speed: 150-250 lb/ac per mph above optimum speed
- Optimum speed = 1.5 to 3 mph Across diggers, years, peanut types

Intense Spatial Data Collection

General test description

Data collected at grid centers: > 350 data entries each

- One-time or periodic measurements:
  Soil texture, organic matter, penetrometer readings, shallow soil fertility, deep soil fertility, stand count, phytotoxicity, thrips, TSWV, weed ratings, hopper burn, late leaf spot, necrotic plants, maturity, weather data, irrigation distribution uniformity, white mold, digging losses, FM/LSK, grade, yield, harvest speed, nematode counts
- Every 2-4 weeks:
  Soil moisture content, soil temperature, canopy temperature, NDVI, canopy height, canopy closure, aerial imagery data

Actual vs. Predicted Production Deficit, lb/ac

2017003 HarvestDeduct Production Deficit lb/ac (dry pod) Predicted P < 0.001 R²=0.96 RMSE=148.9
Model for predicting production deficit

Simulated production deficit as function of copper

- 255 lb/ac increased yield for each 0.1 lb/ac increase in copper

Simulated production deficit as function of boron

- 118 lb/ac increased yield for each 0.1 lb/ac increase in boron

Simulated production deficit as function of TSWV

- 32 lb/ac decreased yield for each 1% increase in TSWV

Primary drivers of other spatial variability

- Maturity
  - pH and micronutrients
- TSWV
  - pH, micronutrients, ring nematode
- LLS
  - Depth to hardpan, P, maturity, Zn
- Thrips damage
  - Lesion nematode, Zn, OM, depth to hardpan
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