Practical Lessons in High Speed Planting

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What is Yield Potential?

- “Yield Potential is defined as the yield of a cultivar when grown in environments to which it is adapted, with nutrients and water non-limiting and with pests, diseases, weeds, lodging, and other stresses effectively controlled.”

**Liebig’s Law of the Minimum**

Don’t let planter performance be your most limiting factor!
Agronomic/Economic Effects of Planters

Best Case: 0 Bu. Lost Yield Potential

Worst Case: 36 Bu./Acre Lost Yield Potential*

(36 X $3.25 = $117/Acre)

*Based on 200 Bu/Acre Yield
Impacts to Yield

Correct Population
2-4 bu/acre

Uniform Spacing
2-4 bu/acre

Uniform Emergence
10-18 bu/acre

Planting Window
4-10 bu/acre

Source: University of Minnesota
Based on 200 bu/acre
Correct Population

2 – 4 Bushels/Acre (based on 200 Bu./Acre Yield)

($6.50 - $13.00)
Correct Population

- Optimum seeding rate depends on historic yield potential
- Match optimum rate with yield potential throughout field with variable rate technology
- Yield potential can vary across a field

Source: DuPont™ Pioneer®
Settings that affect population

Ground Drive
- Vacuum Setting
- Meter Settings
- Overlap
- Transmission Setting
- Contact Tire Pressure

Hydraulic Drive
- Vacuum Setting
- Meter Settings
- Overlap
- Hydraulic System
- Electrical System

Electric Drive
- Vacuum Setting
- Meter Settings
- Overlap
- Electrical System

Goal: Corn = +/- 1000 seeds/acre
    Cotton = +/- 1000 seeds/acre
    Soybeans = +/- 3000 seeds/acre
Uniform Spacing

2 – 4 Bushels/Acre (based on 200 Bu./Acre Yield)

($6.50 - $13.00)
Uniform Spacing – What is NORMAL Spacing?

Desired - The target for spacing is the “Picket Fence”.

Reality - Ground speed & row unit bounce cause spacing to end up more like this.

Poor - Inconsistent seed size and poor maintenance can yield these results.

Reduce Plant Spacing Variability
- Reduce the Skips and Doubles Planted in a row
- Eliminate mechanical issues that affect placement of seed
- Change “POOR” to “REALITY”
Results of Seed Spacing

CoV = 0
CoV = .44
Coefficient of Variation (CV) =

\[
CV = \frac{\text{Standard deviation of seed spacing}}{\text{average distance between seeds}}
\]

CV = \frac{\frac{5''}{6''}}{6''} = .08

CV = \frac{\frac{2''}{6''}}{6''} = .33

CV = \frac{\frac{4''}{6''}}{6''} = .67
Seed Spacing Standard Deviation and Impact on Corn Yields

Source: R.L. Nielsen, Purdue University
Settings that affect spacing

- Meter Settings
- Row Unit Ride Quality
- Seed Delivery Method (seed tube or BrushBelt™)

Goals:
- Singulation for Corn = 97% or above
- Singulation for Cotton = 97% or above
- Singulation for Soybeans = 90% or above
- CoV for Corn = .05 - .2
- CoV for Cotton = .15 - .3
- CoV for Soybeans = .15 - .25
Uniform Emergence

10 – 18 Bushels/Acre (based on 200 Bu./Acre Yield)

($32.50 - $65.00)
Uniform Emergence

- The yield difference between uniform emergence and uneven emergence can be anywhere from 10-18 bu/acre
Factors that AFFECT Uniform Emergence:

- **Planting Depth**
- **Seeds ability to wick moisture**
  - Soil moisture content
  - Air pocket around seed from poor soil to seed contact
  - Residue “hair pinned” into seed trench
- **Crusting at soil surface**
Uniform Emergence – Residue Impacts Emergence
Settings that affect emergence

- Residue Management
- Seed Depth (plant to moisture)
- Row Unit Down Force
- Closing Wheel Down Force

Goal: Good seed to soil contact at consistent depth
Planting Window
4 – 10 Bushels/Acre (based on 200 Bu./Acre Yield)
($13.00 - $32.50)
Planting Window

- Yield declines if planting is delayed: Corn & Soybeans
- Planting date is specific to region
- Late planting can result in wetter crop at harvest

Source: Iowa State University
Planting Window – How long does it take to plant?

**Average Number of Days Required to Plant Corn in 2012:**

- Large Farmers 1,000+ Acres

**Number of Days**

- 0
- 5
- 10
- 15

**Examples:**

- **Iowa** Optimal Number of Days = 5 to 7

Source: Kelly Research Group, Inc. EMR Analysis, Deere & Co.
Planting Window

Yield Loss After Optimum Planting Day

Source: Iowa State University, University of Illinois
Finish Planting Sooner

Days to Plant

- 10 days
- 7 days
- 6 days

5 mph  |  7.5 mph  |  10 mph

2500 acre farm, 24-row planter, average field size 90 acres.

Values from Deere internal calculation based on Cost of Planting model created by Kevin Dhuyvetter, Kansas State University.
Settings that affect productivity

- Planter Size
- Ground Speed
  - 16 Row 30” X 1 MPH = 5 Acres/Hr.
- Seed Capacity
- Fertilizer, Chemical Capacity
- Filling Time
- Time to change settings
- Equipment Reliability

Goal: Plant corn crop in 6 days
Settings that affect productivity

- Planter Size
- Ground Speed
- Seed Capacity
- Fertilizer, Chemical Capacity
- Filling Time
- Time to change settings
- Equipment Reliability

Goal: Plant corn crop in 6 days
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