No-till Planter Set-up for Heavy Residue: Aftermarket Closing Wheel Assessment

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WABA Classic

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Problem Statement

- How do we best no-till plant into heavy residue?
  - Wow! Planter components alone makes this a big study
    - Rollers vs. no rollers
    - Row cleaners vs. no row cleaners
    - Row cleaner settings
      - Just touching or slight tillage on the surface
    - Down force on the row units and seeding depth
    - Seed delivery and seed firmer vs. no seed firmer
    - **Closing wheel type**
    - Closing wheel down pressure

Problem Statement

- The question was also asked with cover crops in mind:
  - Standing green
  - Standing terminated
  - Rolled green
  - Rolled terminated
- Pair the question down to something reasonable:
  - What effect does closing wheel type have on plant emergence and yield when no-till planting into heavy residue?

Experimental Design

- Four site locations across WI:
  - Rock Co., Dane Co., Marathon Co., and Dunn Co.
  - Soils spanned heavy clay to sandy loam
- Four row John Deere 1700
  - Pneumatic down force
  - Hydraulic row unit drives
  - Typical MaxEmerge™ row units
  - 3-point mounted

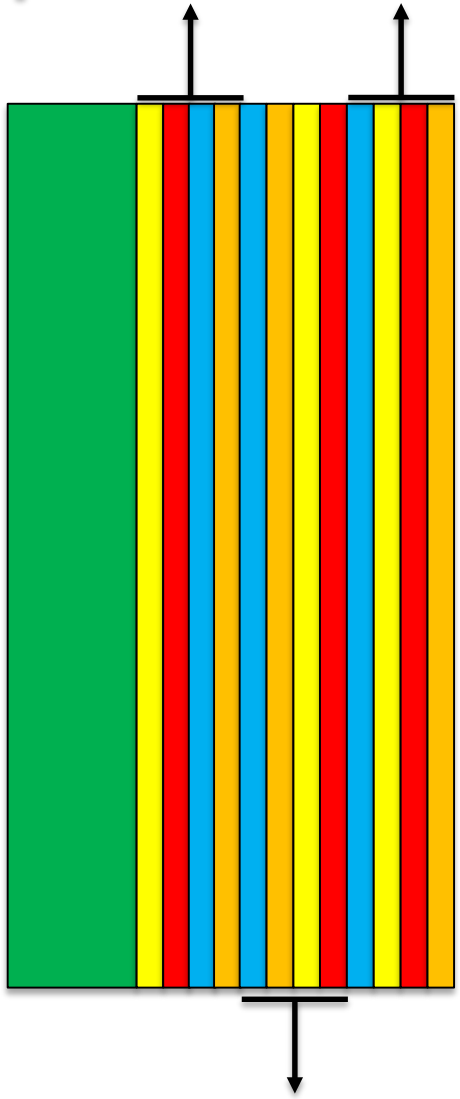
Experimental Design

- Two different corn hybrids were used between the Northern and Southern sites
  - Pioneer™ P0339AMXT (Southern – 103 day)
  - Tracy Seeds T086-26-GTA (Northern – 86 day)
- Seeding rate remained constant at each location
  - 36,000 Seeds/Acre
- 2” seeding depth at all locations
- Management after seeding was treated the same as the remainder of the field -> standard ag. practices
- Closing wheel down pressure assessed at each location

Experimental Design

Experimental Design

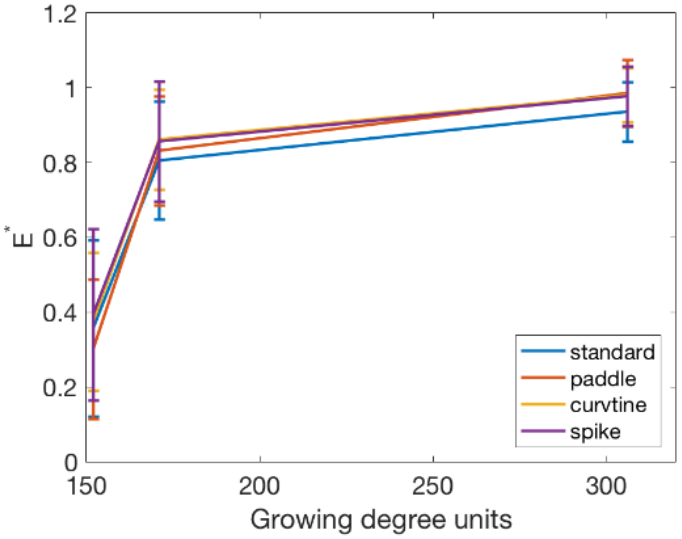
- Row effects were blocked and randomized
- Each pass required removing and reinstalling the closing wheels.
- ~120 replicate passes at each location



Data Collection

- Emergence counted at each location several times
  - Based on growing degree units past planting
  - Goal was to assess emergence rate differences and final emergence of the plants
- Yield was measured to assess any differences at each location
  - Hand harvested in Dane Co.
  - Almaco plot combine used in all other locations
    - Thanks to Dr. Smith (Plant Path.) and Marshfield ARS!

Results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1
0.8
0.6
0.4
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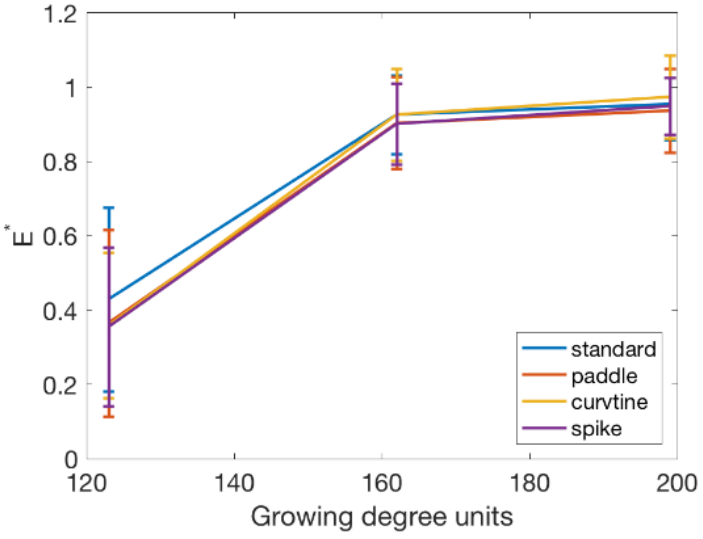
0
E*
150
200
250
300
Growing degree units
standard
paddle
curvtine
spike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0.8
0.6
0.4
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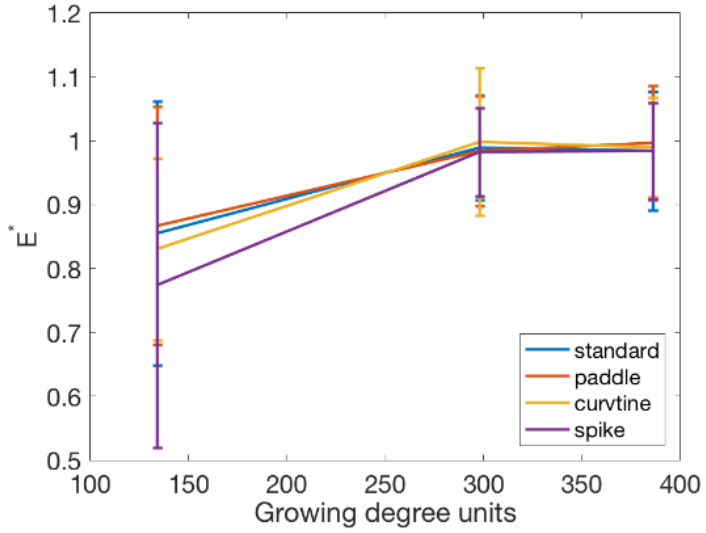
E*
120
140
160
180
200
Growing degree units
standard
paddle
curvtine
spike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1
0.9
0.8
0.7
0.6
0.5
E*
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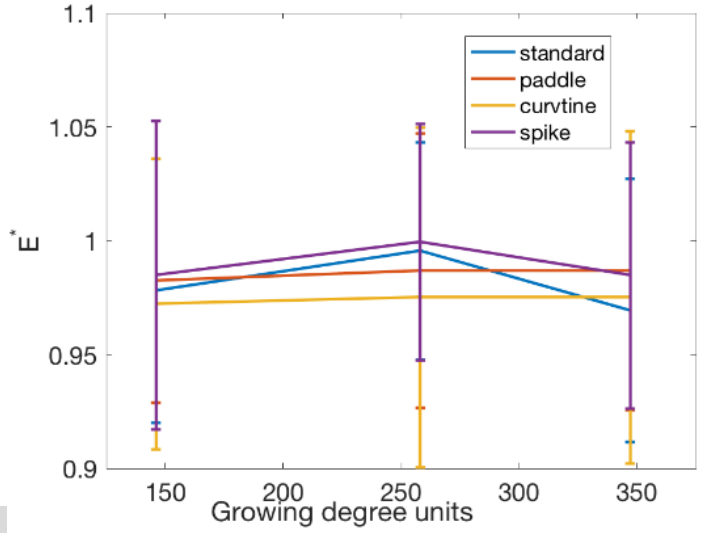
150
200
250
300
350
400
Growing degree units
standard
paddle
curvtine
spike


1.1
1.05
1
0.95
0.9
E*
150
200
250
300
350
Growing degree units
standard
paddle
curvtine
spike

Results

- There are none @ 95% confidence interval (α = 0.05)
- No statistical differences detected between closing wheels
- Emergence was statistically different across sites

Wheel Type	Location	Emergence	Statistical Significance
Standard	all	96%	No
Yetter Paddle	all	98%	No
Dawn Curvtine	all	98%	No
Martin Spike	all	97%	No
all	Rock Co.	97%	Yes
all	Dane Co.	95%	Yes
all	Dunn Co	99%	Yes
all	Marathon Co.	98%	Yes

Results

- Let's relax our standards a bit (typical Engi-nerd)
- Comparing emergence of all aftermarket closing wheels to the standard closing wheel (confidence interval of 90%, $\alpha = 0.10$) the aftermarket closing wheels outperformed the standard closing wheel (P-value = 0.068)!
- Standard Closing Wheel Emergence of 95.6%
  - Standard Error = 0.94%
- Aftermarket Closing Wheel Emergence of 97.6%
  - Standard Error = 0.61%

Recommendations

- For this study…wait and see.
  - We are planning to repeat the study again in 2018
  - The higher the N the lower the error! (old statistical proverb)
- What are we trying to achieve?
  - Seed to soil contact, reduction in sidewall compaction, and somewhat tilled soil directly above the seed for best/easiest emergence
  - Differing soil conditions will impact performance of these closing wheels (soil moisture at planting, residue, etc.)

Recommendations

- None of the closing wheels had any trouble planting in the high residue environment
  - No-till into corn stubble – Dawn Curvetine™ occasionally picked up a corn cob
  - No wrapping or clogging with the green cover crop environment
- Spiked closing wheels were not ideal in the clay loam soils in Marathon County
  - Envision a sewing machine
- Mixing an aftermarket wheel with a standard might be the best compromise for cost and benefit (added to 2018 study)

Questions?

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