Effect of Planter Down Force at Planting on Yield

Background

Planting time is the last opportunity to alter the physical environment in the soil to provide optimal conditions for seed germination and early growth. This is especially critical in no-till situations since it represents the only time the soil will be modified to provide these desired conditions. For optimal conditions seeds should be placed at a uniform depth, with good seed-to-soil contact, and uniform seed spacing.¹

Consistent seed depth at planting is essential to achieve uniform seedling emergence. For example, in corn it is ideal for seeds to emerge within 24 hours of each other. Firm soil limits penetration by the seed opener, which may make it difficult for the depth wheels to make solid contact with the ground surface. This situation may result in a more shallow planting depth. Excessive down force can cause compaction zones and lower actual seeding depth as well as cause problems later in the growing season as roots attempt to grow into additional soil areas.²

Also, when planting in moist conditions, the amount of down force applied can become problematic. Similar to planting in firm soils, if too much pressure is applied when planting in wet soils it can create compaction problems that will adversely impact root structure as the roots attempt to grow into the compacted soil. It is essential to find the right balance of pressure to provide adequate seed-to-soil contact, but without causing over-compaction.³

If not enough down force is applied then planting depth can be too shallow and seed-to-soil contact may not be adequate.

Finding the optimum down force to help provide the right soil conditions for seeds can be a challenge. Planting conditions are typically less than ideal, which makes it more difficult to provide ideal conditions for seeds. Practices and technology that provide better soil conditions for the seed will only serve to increase agronomic efficiency and yield potential.

Study Guidelines

A corn demonstration trial was conducted at the Monsanto Learning Center at Gothenburg, NE to evaluate if consistent planting depth provided by an automatic down force system increases yield potential.

The plot area’s previous crop was corn and the area was strip-tilled on April 16, 2015. A 109 RM corn seed product was planted on May 18, 2015. The trial area was irrigated with 6 inches, which provided a fully irrigated crop during the growing season. Additionally, all plots were grown to maturity using standard agronomic practices and then harvested to determine yields.

Treatments

Treatments of different planting unit down force at planting included the following:
- Manual down force of 0 lbs/acre
- Manual down force of 125 lbs/acre
- Manual down force of 250 lbs/acre
- Manual down force of 375 lbs/acre
- Automatic down force system

The trial was a randomized complete block design with five treatments and three replications.

Results

![Average Yield (bu/acre)](chart)

![Down force - Type and Amount](chart)

Figure 1. Average yield from effect of down force at planting.
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Take-Aways

• Using appropriate amounts of down force at planting can improve yields compared to excessive down force.

• The benefits of automatic down force systems would likely be more evident in fields where greater variability in soil physical properties are encountered at planting.

Sources


Web sources verified 12/21/15.

Legals

The information discussed in this report is from a single site, replicated demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible. ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.

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Figure 2. Down force planting map. Map showing the down force planter setting and the resulting weight riding on the gauge wheel. The red color indicates heavy down force. The diagonal tracks show the sensitivity and speed of the system. Contractors accidentally drove across the plots before planting.
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Figure 3. Corn roots with 375 lbs down force pressure at planting (A) compared to the automatic down force system (B).

A. Corn root grown in the 375 lbs applied down force strip. Note the root is somewhat limited to the seed furrow.

B. Corn root grown in the automatic down force strip which adjusts down force to field conditions. The root system looks less restricted compared to heavier down force on the left.