



# Dryland Corn Yield Response to Increased Management

## Trial Objective

- While farmers focus intensive management efforts on irrigated corn production, dryland corn is often managed much less intensively.
- This trial was conducted to see how dryland corn at different seeding rates responded to more intensive management, including additional sidedress nitrogen applied at the V8 growth stage and Delaro® 325 SC fungicide applied at R1.

## Research Site Details

| Location       | Soil Type      | Previous Crop | Tillage Type | Planting Date | Harvest Date | Potential Yield (bu/acre) | Seeding Rate (seeds/acre) |
|----------------|----------------|---------------|--------------|---------------|--------------|---------------------------|---------------------------|
| Gothenburg, NE | Hord silt loam | Winter wheat  | No-till      | 6/2/19        | 11/12/19     | 160                       | 12K, 18K, 20K, 30K        |

- The study was set up as a split-split plot with fungicide as the whole plot, sidedress nitrogen as the sub-plot, and seeding rate as the sub-sub plot with each treatment replicated three times (Table 1).
- The plot size was relatively large, measuring 410 feet in length by 20 feet wide, with the entire trial size covering 10 acres.
- The sidedress nitrogen treatment of 60 lb N/acre was applied with 360® Y-DROPS sidedress as 32-0-0 on July 13, 2019 at the V8 growth stage.
- The Delaro® 325 SC fungicide treatment at 8 fl oz/acre was applied with a high clearance sprayer on August 9, 2019 at the R1 growth stage.
- Soil samples were taken and analyzed on April 16, 2019. The results measured 39 lb/acre of carryover N in the upper two feet of the soil profile.
- A 110 relative maturity DroughtGard® hybrids with VT Double PRO® technology corn product was used for the trial.
- The row spacing was 30 inches with plots 8 rows wide and the 6 center rows were harvested for yield.
- Nitrogen, phosphorus, and sulfur were broadcast over the trial area at rates of 90, 30, and 25 lb/acre, respectively, on April 23, 2019.
- Weeds were controlled as necessary and no additional fungicide or insecticide was applied.
- The weather was favorable for dryland corn with a good soil moisture profile at planting (3+ feet) and over 20 inches of rainfall during the growing season.
- There were a few challenges for corn during the season, including heavy rains increasing the potential for nitrogen leaching, good conditions for fungal disease development, a late dry period in September, and a hard-killing frost a few days earlier than normal.
- A hard freeze on October 10, 2019 ended the growing season when the corn was at ¾ milk line, so the grain was not quite at maturity.



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Table 1. Trial treatment combinations and the total nitrogen (N) in both applied and carryover forms.

| Treatment | Seeding Rate (seeds/acre) | Delaro® 325 SC Fungicide (fl oz/acre) | Sidedress N (lb/acre) | Spring Applied N (lb/acre) | Carryover N (lb/acre) | Total N (lb/acre) |
|-----------|---------------------------|---------------------------------------|-----------------------|----------------------------|-----------------------|-------------------|
| 1         | 12,000                    | 8                                     | 0                     | 90                         | 39                    | 129               |
| 2         | 18,000                    | 8                                     | 0                     | 90                         | 39                    | 129               |
| 3         | 24,000                    | 8                                     | 0                     | 90                         | 39                    | 129               |
| 4         | 30,000                    | 8                                     | 0                     | 90                         | 39                    | 129               |
| 5         | 12,000                    | 8                                     | 60                    | 90                         | 39                    | 189               |
| 6         | 18,000                    | 8                                     | 60                    | 90                         | 39                    | 189               |
| 7         | 24,000                    | 8                                     | 60                    | 90                         | 39                    | 189               |
| 8         | 30,000                    | 8                                     | 60                    | 90                         | 39                    | 189               |
| 9         | 12,000                    | 0                                     | 0                     | 90                         | 39                    | 129               |
| 10        | 18,000                    | 0                                     | 0                     | 90                         | 39                    | 129               |
| 11        | 24,000                    | 0                                     | 0                     | 90                         | 39                    | 129               |
| 12        | 30,000                    | 0                                     | 0                     | 90                         | 39                    | 129               |
| 13        | 12,000                    | 0                                     | 60                    | 90                         | 39                    | 189               |
| 14        | 18,000                    | 0                                     | 60                    | 90                         | 39                    | 189               |
| 15        | 24,000                    | 0                                     | 60                    | 90                         | 39                    | 189               |
| 16        | 30,000                    | 0                                     | 60                    | 90                         | 39                    | 189               |

## Understanding the Results

- Yields increased with increasing inputs into this dryland corn system.
- Seeding rate had the largest impact on yield with yields increasing up to the 30,000 seeds/acre rate, which was the highest seeding rate tested (Figure 1).
- The average return per acre above the seeding rate also increased with higher seeding rates (Figure 1).
- The additional 60 lb/acre of sidedress nitrogen applied at the V8 growth stage increased yields over the standard spring applied nitrogen rate (Figure 4).
- With favorable weather conditions due to high rainfall, the additional nitrogen may have allowed more nitrogen to be available later in the growing season.
- Fertilizer and application costs totaled \$34/acre and the corn return was \$39/acre at a \$3.50/bu corn price.
- Fungicide application at the R1 growth stage also significantly increased yield by about 8 bu/acre (Figure 5).
- The typical cost of Delaro® 325 SC fungicide and application was approximately \$22.00/acre in 2019 and the added yield netted \$26.95/acre at a corn price of \$3.50/bu (Table 2).



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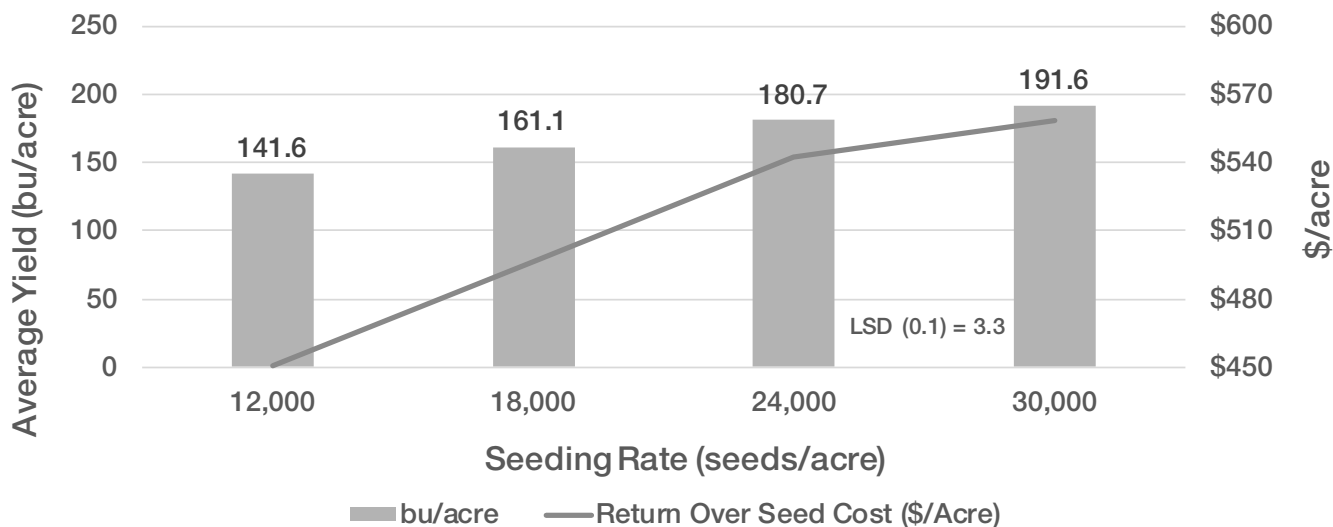


Figure 1. Corn yield and return (\$/acre) over seed cost at four seeding rates.

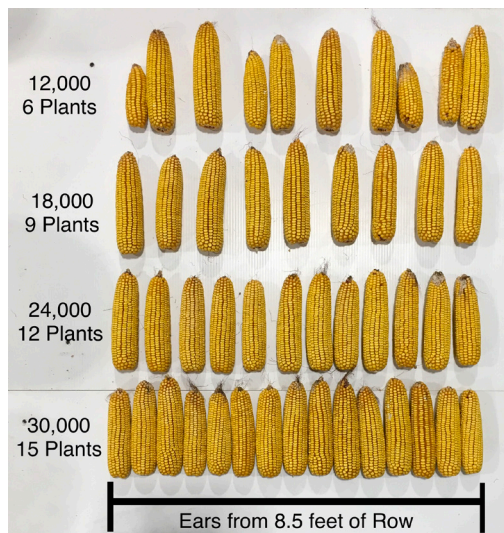


Figure 2. These ears were pulled from 8.5 feet of row showing multiple ears at the lowest seeding rate (12,000 seeds/acre), but more ears overall at the higher seeding rates. The smaller ears at the lowest seeding rate are the second ear on the main stalk or the tiller ear.



Figure 3. Two plants in the 12,000 seeds/acre seeding rate displaying tiller ears and two ears on the main stalk. This is a way that corn adapts to low populations, but the yield was still lower than that at higher seeding rates.



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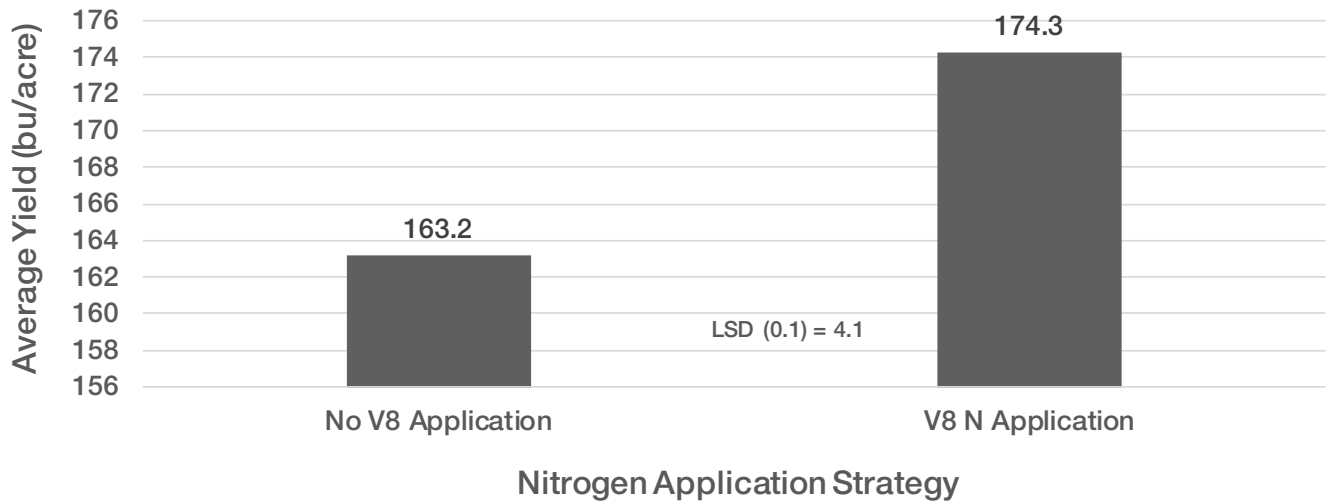


Figure 4. Yield response to additional sidedress nitrogen applied at the V8 growth stage.

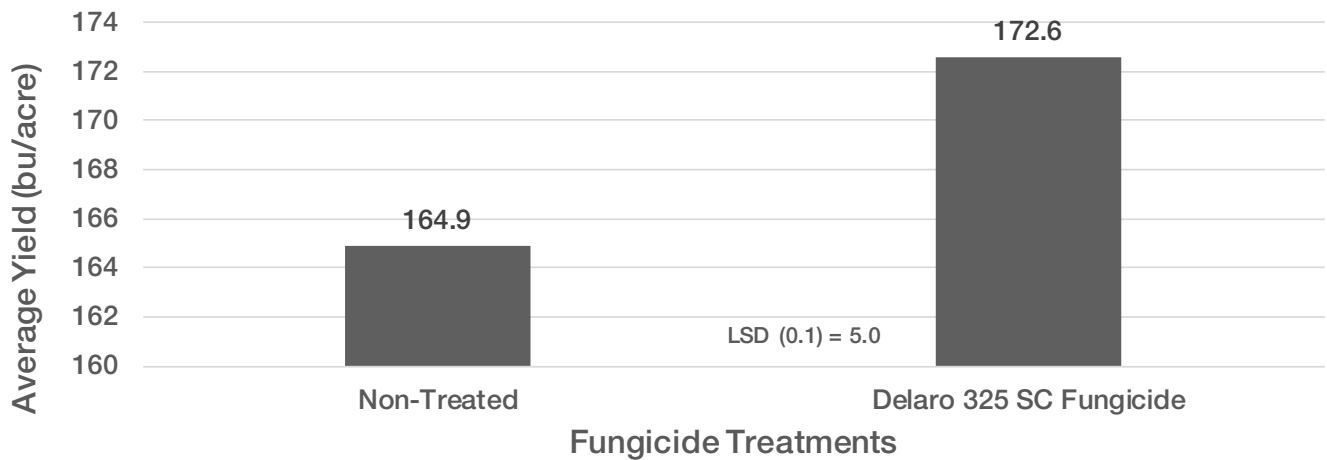


Figure 5. Corn yield with and without an application of Delaro® 325 SC fungicide at the R1 growth stage.



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Table 2. Average yield and net profit rankings of all treatments.

| Treatment | Seeding Rate (seeds/acre) | Delaro® 325 SC Fungicide (fl oz/acre) | Sidedress N (lb/acre) | Average Yield (bu/acre) | Yield Rank | Net Profit (\$/acre) | Net Profit Rank |
|-----------|---------------------------|---------------------------------------|-----------------------|-------------------------|------------|----------------------|-----------------|
| 1         | 12,000                    | 8                                     | 0                     | 141.7                   | 14         | \$428.95             | 14              |
| 2         | 18,000                    | 8                                     | 0                     | 161.5                   | 11         | \$475.75             | 9               |
| 3         | 24,000                    | 8                                     | 0                     | 178.6                   | 6          | \$513.10             | 6               |
| 4         | 30,000                    | 8                                     | 0                     | 188.9                   | 4          | \$526.65             | 3               |
| 5         | 12,000                    | 8                                     | 60                    | 149.3                   | 13         | \$421.55             | 15              |
| 6         | 18,000                    | 8                                     | 60                    | 166.5                   | 9          | \$459.25             | 12              |
| 7         | 24,000                    | 8                                     | 60                    | 191                     | 3          | \$522.50             | 4               |
| 8         | 30,000                    | 8                                     | 60                    | 203.4                   | 1          | \$543.40             | 2               |
| 9         | 12,000                    | 0                                     | 0                     | 136.2                   | 16         | \$431.70             | 13              |
| 10        | 18,000                    | 0                                     | 0                     | 152.5                   | 12         | \$466.25             | 11              |
| 11        | 24,000                    | 0                                     | 0                     | 169.6                   | 8          | \$503.60             | 8               |
| 12        | 30,000                    | 0                                     | 0                     | 176.9                   | 7          | \$506.65             | 7               |
| 13        | 12,000                    | 0                                     | 60                    | 139.3                   | 15         | \$408.55             | 16              |
| 14        | 18,000                    | 0                                     | 60                    | 164                     | 10         | \$472.50             | 10              |
| 15        | 24,000                    | 0                                     | 60                    | 183.5                   | 5          | \$518.25             | 5               |
| 16        | 30,000                    | 0                                     | 60                    | 197.2                   | 2          | \$543.70             | 1               |

Net profit is based on a corn price of \$3.50/bu, an 8 fl oz/acre Delaro® 325 SC fungicide treatment cost of \$15/acre, a fungicide application cost of \$7.00/acre, an additional 60 lb N/acre as 32-0-0 at \$27.00/acre, and a sidedress nitrogen-application cost of \$7.00/acre.

## Key Learnings

- Yields were improved by intensively managing dryland corn under these test conditions.
- All the decisions about how to intensively manage dryland corn acres do not need to be made early in the season and some can be made later in response to the growing environment.
  - The decision on whether to increase the seeding rate should be based on stored soil moisture at planting and the outlook for precipitation in long-term forecasts.
  - Additional sidedress nitrogen can be made at the V8 growth stage and even beyond with specialized equipment. Growing conditions should be evaluated throughout the season to determine if yield potential may warrant an application.
  - Finally, at the R1 growth stage, growing conditions can be evaluated to see if the yield potential and disease pressure warrants a fungicide application.



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## Legal Statements

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