# 2024 ON-FARM RESEARCH RESULTS

NEBRASKA ON-FARM RESEARCH NETWORK

EC3079

# NEBRASKA ON-FARM RESEARCH NETWORK

## 2025 Conference Dates and Location

*All Meetings: 9am-3pm*

**York** | Feb. 18 | Holthus Convention Center

**Columbus** | Feb. 19 | Ag Park

**Mead** | Feb. 20 | ENREC Auditorium

**Kearney** | Feb. 25 | Buffalo County Extension Office

**Alliance** | Feb. 27 | Knight Museum and Sandhills Center

**Beatrice** | Mar. 4 | Holiday Inn

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Nebraska Dry Bean Commission

NEBRASKA ON-FARM RESEARCH

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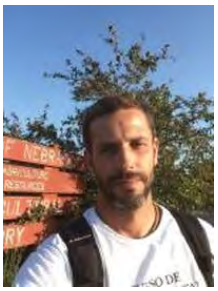

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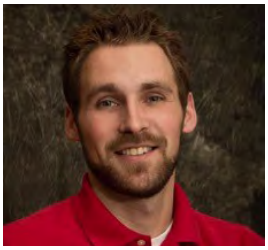

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# THANK YOU

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## Thank you also to the companies and businesses that assisted with the research projects.

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## INTRODUCTION

The longer you are involved in the Ag industry, the more you may realize that every year is uniquely different. In 2024, we faced perennial and new challenges, a shift in commodity prices, and late summer weather patterns that effected crop production. Through these challenges, farmers pushed through these barriers about how to maximize input efficiency, utilization of new technology and digital Ag, and an increased focus of sustainable practices. The planning and execution of these efforts were sharpened by peers, UNL faculty, crop consultants, and those involved in the industry. The collection of reports discussed in this 2024 edition is a testament to the continuation of critical thinking and the strong desire to push for excellence in our state.

Our Nebraska On-Farm Network wants to share gratitude to all of the farmers, crop consultants, and those who assisted and performed projects in 2024. Many of these projects were conducted by repeat farmers. Our hope is these repeat farmers and new farmers have gained knowledge both in their own projects, but across all projects in the collection. The purpose of On-Farm Research is to provide tangible answers in your own fields, or as close as possible. One key theme I have seen in the collection of 2024 reports is one of ambition to research topics that may become problematic in future years, or testing of the newest technology. This mindset to have answers before key issues affect our state is one of adaptability, against reactivity. This theme, combined with sustainability, input efficiency, and nutrient management, is why I'm proud to work with Nebraska farmers.

If interested in participating in 2025, we are always looking for more participation in the wide array of production topics. Our goal is to provide a long arm of the University of Nebraska, directly assisting farmers and their questions. The collection of 2024 reports is a building block of research; building upon previous research conducted by farmers, and hopefully providing a cornerstone of research for future years. Once again, thank you.

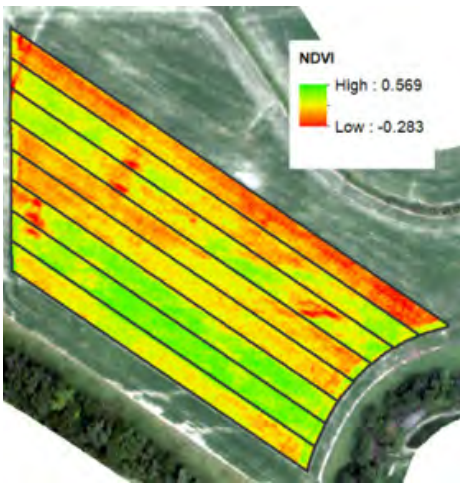
*Adam Leise*

## AERIAL IMAGERY

For many studies, aerial imagery was captured using a drone, airplane or satellite.

### True Color Imagery/RGB:

True Color imagery displays the Earth in colors similar to what we might see with our own eyes. This product is a combination of the red, green, and blue wavebands of visible light and, as such, is sometimes referred to as RGB imagery.




### Normalized Difference Vegetation Index (NDVI):

NDVI is calculated using the red and near-infared (NIR) wavebands as follows: NDVI = (NIR-Red) / (NIR+Red). This index is often correlated with plant biomass and/or a higher chlorophyll concentration. In the example at left, NDVI was displayed with a green to red color ramp: areas with higher NDVI value appear bright green, areas with lower NDVI values appear red and intermediary values are yellow.

### Normalized Difference Red Edge (NDRE) Index:

This index is similar to NDVI and is displayed similarly to NDVI, but it is calculated with the red edge waveband in place of the red waveband as follows: NDRE = (NIR-Red Edge)/(NIR+Red Edge). NDRE is also correlated with plant biomass and chlorophyll content. This index is often preferred over NDVI when looking at high biomass crops (such as corn in the mid and late growth stages). Higher NDRE values are indicative of greater plant biomass and/or higher chlorophyll concentration.

# STATISTICS 101

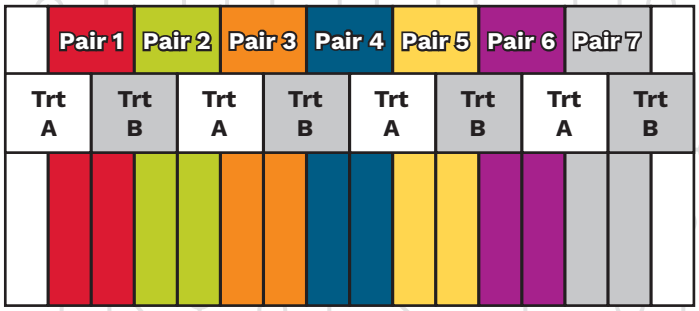
**Replication:** In statistics, replication is the repetition of an experiment observaton in same or similar conditions. Replication is important because it adds information about the reliability of the conclusions or estimates to be drawn from the data. The statistical methods that assess the reliability rely on replication.

**Randomization:** Using random sampling is a method of selecting a sample from a population in which all the items in the population have an equal chance of being chosen in the sample. Randomization reduces the introduction of bias into the analysis. Two common designs that meet these criteria are shown on the right.

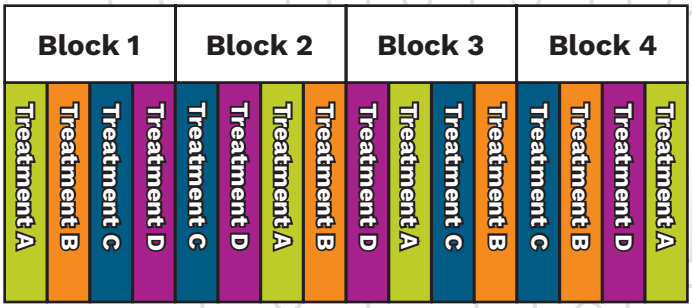
**What is the P-Value?** In field research studies we impose a treatment. This treatment may be a new product or practice that is being compared to a standard management. Both the treatments that we are testing and random error (such as field variability) influence research results (such as yield). You intuitively know that this error exists - for example, the average yield for each combine pass will not come out exactly the same, even if no treatments were applied. The Probability (P) - Value reported for each study assists us in determining if the differences we detect are due to error or due to the treatment we have imposed.

- As the P-Value decreases, the probability that differences are due to random chance decreases.
- As the P-Value increases, we are less able to distinguish whether the difference is due to error or the treatment. Hence, we have less confidence in the results being due to the treatment.

**Paired Comparison Design**



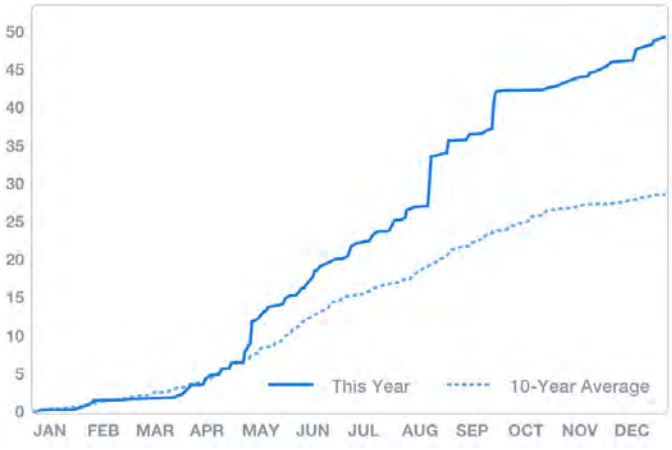

**Randomized Complete Block Design**




For these studies, we have chosen a cutoff P-Value of 10%. Therefore, if the P-value is greater than 10%, we declare that there are not statistically significant differences due to the treatments. If the value is less than 10%, we declare that differences between treatmnents are statistically significant. When this is the case, we follow the yield values with different letters to show they are statistically different. The value of 10% is arbitrary - another cutoff could be chosen. As you increase your cutoff value, however, you increase the chance that you will declare that treatments are different when the really are not. Conversely, if you lower the P-Value, you are more likely to miss real treatment differences.

Unless otherwise noted, data in this report were analyzed using Statistixs 10.0 Analytical Software and means were separated using Tukey's HSD (honest significant difference) test.

# RAINFALL DATA




Rainfall data are provided for each study based on the field location. The rainfall graphs are developed using data from National Weather Service radar and ground stations that report rainfall for 1.2 x 1.2 mile grids.

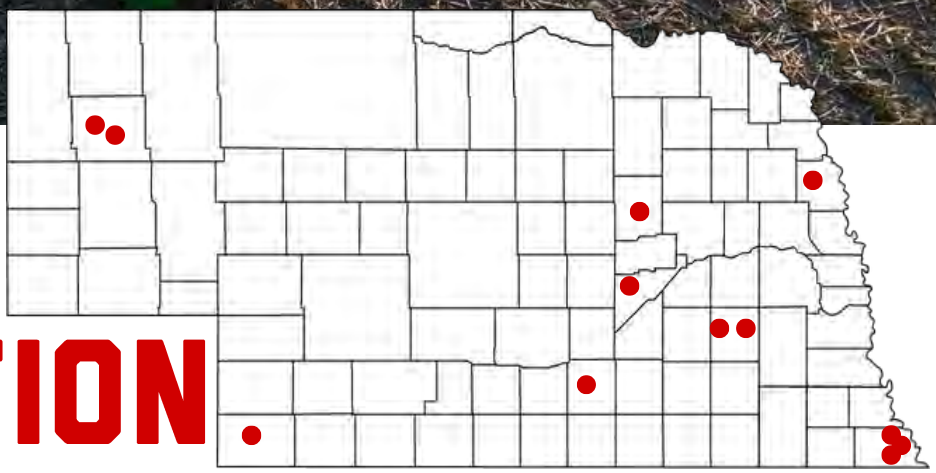
# PROFIT CALCULATION

Many of our studies include a net return calculation. It is difficult to make this figure applicable to every producer. In order to calculate revenue for our research plots, we use input costs provided by the producer, application costs from Nebraska Extension's 2022 Nebraska Farm Custom Rates and an average commodity market price for 2023. Average market commodity prices for the 2023 report are:

Wheat: $6.60/bu
Corn: $4.35/bu
Soybeans: $11.00/bu
Pinto Beans: $24/bu
Black Eyed Peas: $36/bu

For each study, net return is calculated as follows:
Net Return = gross income (yield x commodity price) - treatment cost

In order to make this information relevant to your operation, you may need to refigure return per acre with costs that you expect.

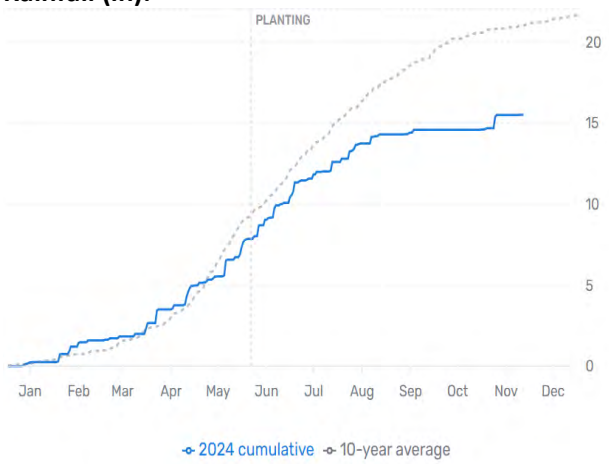


# CROP PRODUCTION

# Great Northern Dry Edible Bean Inoculant Study

**Study ID:** 0152013202401
**County:** Box Butte
**Soil Type:** Valentine sandy loam
**Planting Date:** 6/5/24
**Harvest Date:** 9/18/24
**Population:** 107,000
**Row Spacing (in):** 15”
**Variety:** Eiger Great Northern
**Reps:** 6
**Previous Crop:** Corn
**Tillage:** 2 passes with Landoll® VT disk, rolled then planted
**Herbicides:** ***Pre:*** 30 oz/ac Prowl® H20 + 15 oz/ac Outlook® + 32 oz/ac Roundup PowerMAX® ***Post:*** 4 oz/ac Raptor® +30 oz/ac Basagran® + 15 oz/ac SelectMax®
**Seed Treatment:** Apron® XL, Maxim®, Rancona®, Vibrance®, Cruiser®

**Foliar Fungicides:** 5.7 oz/ac Proline® 480 SC
**Fertilizer:** 20 lb N/ac, 25 lb P/ac, 15lb S/ac, 1 lb ZN/ac, dry spread
Note: Temp at harvest: 75 degrees, 27% RH
**Irrigation:** Pivot, Total: 12"
**Rainfall (in):**




**Introduction:** This study evaluated Exceed® Superior Legume Inoculant on dry edible bean production. The active ingredient is *rhizobium leguminorsarum biovar phaseoli*. The dry inoculant was throughly blended with seed in the planter box before planting at a rate of 82.5 oz per 1500 lbs of seed. The dry edible beans were direct harvested on September 18, 2024, at a temperature of 75° F and 26% relative humidity. Samples from each plot were analyzed for bean quality parameters. Harvest loss estimates were determined by taking counts in one-square-foot frames randomly chosen in the harvested area, but equally representing the left, center, and right side of the header area behind the combine. Total available N in the top 36” of soil was 53 lbs per acre. 100 lb N/ac is recommended for top bean yields but in situations where N is lower, the inoculant may help increase yield.

**Results:**

| | Stand Count (plants/ac) | Small (%) | Foreign Material (%) | Moisture (%) | Harvest Loss (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|---|
| No inoculant | 97,792 A* | 1.58 B | 1.35 A | 9.9 A | 1.35 A | 35 B | 866 B |
| Exceed ® Superior Legume Inoculant | 98,083 A | 0.90 A | 1.32 A | 9.8 A | 1.32 A | 38 A | 936 A |
| P-Value | 0.959 | 0.098 | 0.903 | 0.272 | 0.90 | 0.027 | 0.029 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 14% moisture.
‡Marginal net return based on $24.60/bu at 60 lb/bu and $2.14/ac for Exceed® Superior Legume Inoculant.

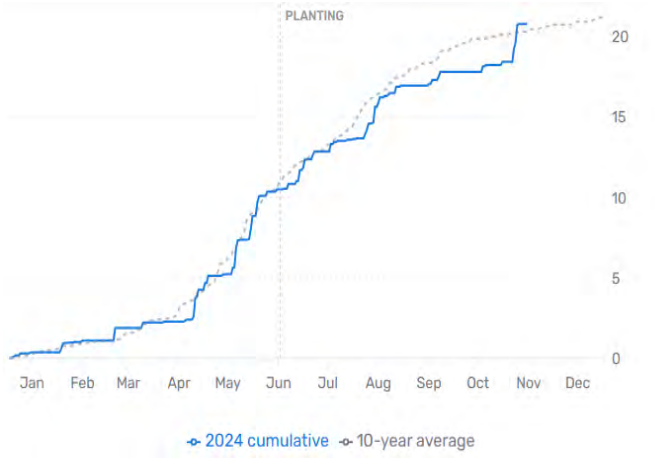
**Summary:**

- There were no significant differences in stand count, foreign material, moisture, or harvest loss.
- There were significant differences in percent small, yield, and marginal net return. The addition of Exceed ® Superior Legume Inoculant yielded significantly higher (38 bu/ac) when compared against no inoculant (35 bu/ac). Furthermore, marginal net return was higher with the addition of inoculant ($936/ac) when compared against no inoculant ($866/ac).

# Dry Bean Population Study

**Study ID:** 1535057202401
**County:** Dundy
**Soil Type:** Sarben loamy sand
**Planting Date:** 6/16/24
**Harvest Date:** 9/13/24
**Population:** Varies
**Row Spacing (in):** 30”
**Variety:** California Black-Eyed Pea #5
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 10 oz/ac Latigo® + 1.5 oz/ac flumioxazin + 40 oz/ac glyphosate + 6.4 oz/ac Hellfire®. ***Planting:*** 3 oz/ac Sulfin® +1.3 pts/ac Medal II®+ 40 oz/ac glyphosate + 1 pt/ac Grounded® + 1.5 lbs/ac AMS. ***Post:*** Desiccation: 2 oz/ac Sharpen® + 1.3 pts/ac Paraquat® + 16 oz/ac Firezone®

**Seed Treatment:** Maxim® + Apron® + Cruiser®
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** 5 gal/ac 32%-0-0 UAN, applied at desiccation
**Irrigation:** None
**Rainfall (in):**




**Introduction:** The purpose of this study was to compare three planting rates of Black-Eyed Peas (California #5 variety) planted in 30" row spacing. The target populations in this study were 60,000, 80,000 and 110,000 plants per acre. Due to germination and planter issues these populations were not achieved. Actual populations were determined by early season stand counts and were 44,312, 61,297, and 79,588 plants/ac. To estimate the treatment seeding rate and subsequent seed costs, 10% was added to the stand count values; this resulted in treatment seeding rates of approximately 48,743, 67,427, and 87,547 seeds/ac, and assumes all treatments had similar emergence and germination. Samples from each plot were analyzed for bean quality parameters. Harvest loss estimates were determined by taking counts in one-square-foot frames randomly chosen in the harvested area, but equally representing the left side of header, center of header, and right side of header area behind the combine.

**Results:**

| Target Population | Stand Count (plants/ac) | Harvest Loss | Split (%) | Foreign Material (%) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|---|
| 60,000 | 44,312 C* | 0.53 A | 4.8 A | 4.1 A | 9.7 A | 14 A | 468 A |
| 80,000 | 61,297 B | 0.85 A | 5.3 A | 3.8 A | 9.6 A | 15 A | 501 A |
| 110,000 | 79,588 A | 0.65 A | 5.9 A | 4.4 A | 9.7 A | 13 A | 415 A |
| P-Value | <0.001 | 0.697 | 0.264 | 0.84 | 0.422 | 0.398 | 0.2714 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 14% moisture.
‡Marginal net return based on $36/bu black-eyed peas, $36.07/ac for 60,000, $49.90/ac for 80,000, and $64.78/ac for 110,000.seeds/ac

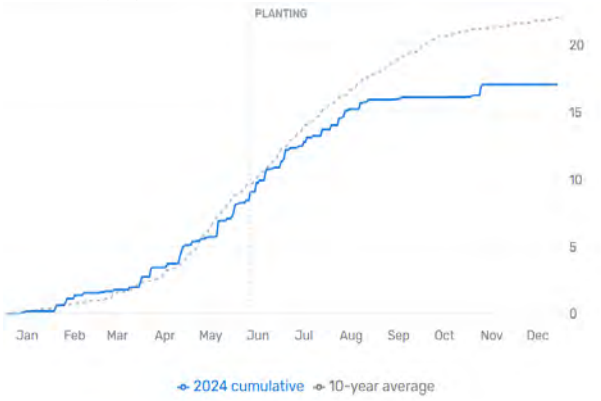
**Summary:**

- There were significant differences between stand counts.
- There were no significant differences in harvest loss, percent split, foreign material, moisture, yield, or marginal net return between treatments.
- Even though germination and planting issues affected the stand counts, there were no significant yield differences between the three target populations. Rainfall was also slightly lower than normal, which could have lowered yields for all three treatments.

# Pod Ceal® for Direct Harvest in Great Northern Beans

**Study ID:** 0015013202401
**County:** Box Butte
**Soil Type:** Valentine sandy loam
**Planting Date:** 6/10/24
**Population:** 110,000
**Row Spacing (in):** 7.5”
**Variety:** Virgo Great Northern
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** 2x disk, 1 pass finisher w/dry spread fertilizer
**Herbicides:** ***Pre:*** 32 oz/ac Roundup PowerMAX® + 2 pt/ac Prowl® H20 + 2 oz/ac AIM® ***Post:*** Varisto® + Outlook® + Cleo® + Basagran®
**Seed Treatment:** Apron® + Maxim® + Rancona® + Vibrant® + Crusier®
**Foliar Insecticides:** None
**Foliar Fungicides:** None

**Fertilizer:** April 2024: Dry Spread: 125 lbs/ac 11-52-0 MAP, 6.6 lbs/ac Nitrolock® urea, 3.6 lbs/ac manganese 8% LS, 5 lbs/ac Soygreen® granular, 1.4 lbs/ac zinc 10%
**Irrigation:** Pivot, Total: 8-10"
**Rainfall (in):**




**Introduction:** Pod Ceal® by Miller® is a product applied on dry edible beans to reduce moisture intrusion into the pod. The product is a formulation of cyclohexane polymer concentrate, which forms an elastic, semi-permeable membrane on the pods. The intent is to reduce harvest loss due to shelling by preventing pods from popping open during natural wetting and drying prior to harvest. This producer was interested in evaluating Pod Ceal® on pinto beans to determine the impact on yield and harvest loss. Pod Ceal® was applied on September 18, 2024, at a rate of 1 pt/ac, and was compared to an untreated check. Both treatments received a Paraquat® desiccation application on September 18, 2024. The Pod Ceal® treatment and Paraquat® were applied in a tank mix. The field was harvested with a Gleaner® S77 Combine with MacDon® 35 foot FlexDraper® head.

**Baseline Soil Samples 0-8” (December 2023):**

| pH | OM LOI % | Nitrate–N ppm N | P1-Bray ppm P | Sulfur ppm S | K ppm | Ca ppm | Mg ppm | Na ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|---|
| 7.6 | 1.0 | 12 | 16 | 10 | 318 | 1338 | 238 | 54 | 9.7 |
| 7.6 | 1.5 | 10 | 13 | 10 | 290 | 1277 | 290 | 59 | 9.4 |
| 7.4 | 1.3 | 11 | 16 | 8 | 275 | 1151 | 275 | 53 | 8.5 |

Samples from each plot were analyzed for bean quality parameters. Harvest loss estimates were determined by taking counts in one-square-foot frames randomly chosen in the harvested area, but equally representing the left, center, and right side of the header area behind the combine.

**Results:**

| | Harvest Loss (bu/ac) † | Split (%) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| Check | 2.4 A* | 1.8 A | 9.3 A | 41 A | 979 A |
| Pod Ceal® | 2.2 A | 1.6 A | 9.3 A | 41 A | 968 A |
| P-Value: | 0.43 | 0.68 | 0.49 | 0.86 | 0.55 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 14% moisture.
‡Marginal net return based on $24/bu at 60 lb/bu for pinto beans and $14.49/ac for Pod Ceal®.

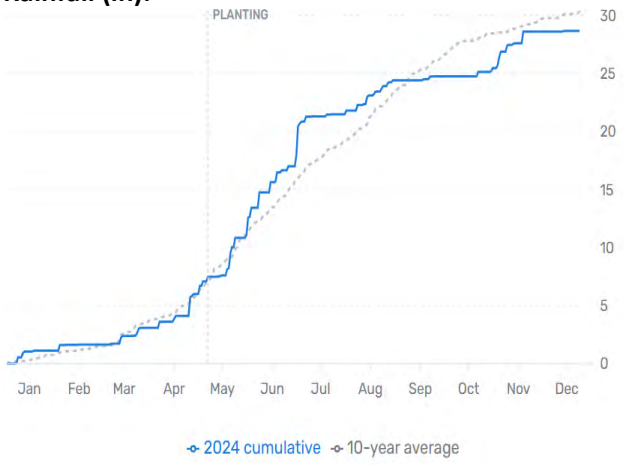
**Summary:**

- There were no significant differences for harvest loss, percent splits, moisture, yield or marginal net return between the treatments.
- The addition of Pod Ceal® by Miller® did not signifcantly improve yield or reduce marginal net return against an untreated check. Furthermore, the addition of Pod Ceal® did not significantly reduce harvest loss. This study design hopes to be repeated in 2025.

# Evaluating Four Soybean Maturities

**Study ID:** 0802159202401
**County:** Seward
**Soil Type:** Hastings silt loam; 0-1% slopes
**Planting Date:** 5/6/24 for 2.1, 5/8/24 for rest
**Harvest Date:** 9/19/24 for Groups 2.1, 2.3. 9/25/24 for groups 2.7, 3.1.
**Population:** 135,000
**Row Spacing (in):** 30”
**Variety:** Varied
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** Ridge-Till
**Herbicides:** ***Pre:*** Enlist®, Zidua®, Roundup PowerMAX® ***Post:*** Enlist®, Roundup PowerMAX®
**Seed Treatment:** Pioneer® full seed treatment: LumiTreo®, Luminate®, Sebring metalaxyl, L-2030 biofungicide®, ILEVO HL®, Phalanx ® Insecticide, Lumiderm®

**Fertilizer:** 100 lb /acre 10-24-0-10S-1Z
**Irrigation:** Gravity, Total: 4.4”
**Rainfall (in):**




**Introduction:** With an increasing focus on early planting of soybeans, growers are interested in planting both shorter-season and longer-season varieties to spread the risk load from weather impacts and harvest timing. A shorter-season variety can also aid in planting cover crops after harvest for grazing, erosion, or weed control. A longer-season variety may help take advantage of the longer growing season with higher yields. The goal of this study was to determine any impacts to yield and economics of planting soybean varieties to achieve optimal yields when planting early. This is the seventh year of evaluations of different soybean maturity groups (5 years with dicamba-tolerant soybeans, and this is the second year of Enlist-tolerant soybeans). This study compared Enlist-tolerant soybean varieties including group 2.1 (Pioneer® P21Z88E), 2.3 (Pioneer® P23Z58E), 2.7 (Pioneer® P27Z41E), and 3.1 (Pioneer® P31Z03E). The group 2.1 soybeans were planted May 6, 2024. A heavy rain ceased further planting. The other varieties were planted two days later. The group 2.1 and 2.3 beans were harvested on September 19, 2024, and the group 2.7 and 3.1 beans were harvested on September 25, 2024. The group 2.7 and 3.1 beans had green stems with some leaves, but the combine was harvesting them, so the grower chose to get them while he was harvesting in the area. Soybean stand counts (plants/ac) were taken on September 16, 2024, for the 2.1 and 2.3 varieties, and September 19, 2024, for the 2.7 and 3.1 varieties.

**Results:**

| | Harvest Stand Count (plants/ac) | Moisture (%) | Test Weight (lb/bu) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| Group 2.1 (Pioneer® P21Z88E) | 82,125 B* | 13.2 B | 56.6 A | 82 B | 848 A |
| Group 2.3 (Pioneer® P23Z58E) | 100,500 A | 16.5 A | 55.4 AB | 83 AB | 857 A |
| Group 2.7 (Pioneer® P27Z41E) | 100,250 A | 18.6 A | 54.2 AB | 83 AB | 852 A |
| Group 3.1 (Pioneer® P31Z03E) | 97,750 AB | 18.9 A | 53.6 B | 86 A | 889 A |
| P-Value | 0.041 | 0.002 | 0.051 | 0.086 | 0.1 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybean, $56.70/ac for Pioneer™P21Z88E, $56.0/ac for Pioneer™ P23Z58E, $57.40/ac for Pioneer ™ P27Z41E, and $58.10/ac for Pioneer ™ P31Z03E.

**Summary:**

- Pioneer™ P31Z03E (Group 3.1) yielded higher (86 bu/ac), had higher moisture and thus lower test weight than Pioneer™ P21Z88E (82 bu/ac). Otherwise, there were no differences in yield amongst the varieties.
- There were no differences in marginal net return.
- There were significant differences in harvest stand count, moisture, and test weight.
- The lower plant stand of Pioneer™ P21Z88E may have been impacted by the heavy rains just after planting.
- Planting earlier or later season maturities depends on the grower's system and level of risk, particularly when in non-irrigated situations.

# Irrigated Soybean Population Study

**Study ID:** 1539121202401
**County:** Merrick
**Soil Type:** Valentine-Boelus loamy fine sand 3-9% slopes
**Planting Date:** 4/20/24
**Population:** Variable
**Row Spacing (in):** 15”
**Variety:** Pioneer® P21A53E
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Post:*** June 1: 24 oz/ac Durango® + 24 oz/ac Enlist® + 4.5 oz/ac Redlock® + 1.5 oz/ac Zidua SC®.
June 28: 64 oz/ac Elevate® + 32 oz/ac Enlist Duo® + 6 oz/ac HiLo® + 32 oz/ac Liberty®+ 3.9 oz/ac RedLock® + 16 oz/ac Roundup PowerMAX®+ 3.9 oz/ac StrikeForce® + 1.5 oz/ac Zidua SC®
**Irrigation:** Pivot
**Rainfall (in):**


**Introduction:** This study utilized variable-rate seeding technology to evaluate four different seeding rates to determine which rate maximized yield and profit. A variable-rate prescription was developed to create randomized and replicated plots that were approximately 285 feet long by 200 feet wide blocks, as illustrated in figure 1. The target seeding rates were 100,000, 120,000, 140,000, and 160,000 seeds per acre. Stand counts were conducted for each seeding rate on May 28, 2024. We evaluated stand counts, yield, and net return. The prescription map was created and remotely uploaded to the tractor by our John Deere® Precision Product Specialist. The project required minimal in-field effort from the farmer as the randomized and replicated plots were established by the planter during seeding, and the combine collected the harvest data while harvesting the field.

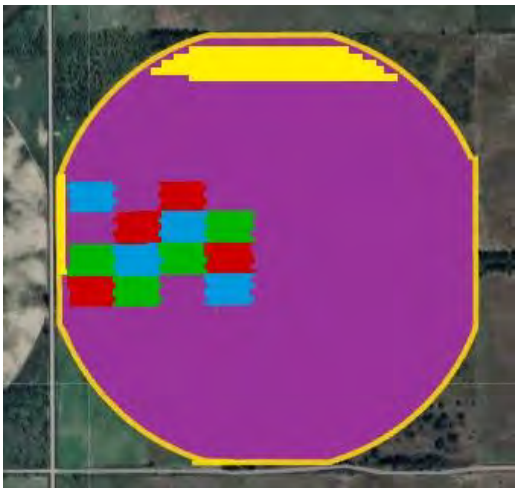


**Figure 1:** Project Design and Layout

**Results:**

| | Stand Counts (plants/acre) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| 100,000 seeds/ac | 66,417 D* | 11.8 A | 77 A | 786 A |
| 120,000 seeds/ac | 81,500 C | 12.1 A | 77 A | 776 A |
| 140,000 seeds/ac | 100,417 B | 12.1 A | 79 A | 787 A |
| 160,000 seeds/ac | 124,417 A | 12.0 A | 78 A | 762 A |
| P-Value | 0.001 | 0.94 | 0.98 | 0.98 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, $59.61/ac 100,000 seeds/ac, $71.53/ac 120,000 seeds/ac, $83.45/ac 140,000 seeds/ac, and $95.38/ac 160,000 seeds/ac.

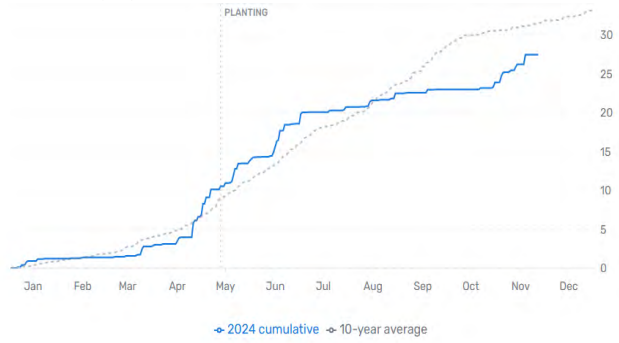
**Summary:**

- There were no significant differences between moisture, yield, or marginal net return.
- These results are consistent with previous on-farm research findings.

# Irrigated Soybean Population Study

**Study ID:** 1537021202401
**County:** Burt
**Soil Type:** Onawa silty clay; Blyburg silt loam
**Planting Date:** 5/12/24
**Harvest Date:** 10/02/24
**Population:** Variable
**Row Spacing (in):** 15”
**Reps:** 4
**Previous Crop:** Corn
**Herbicides:** ***Pre:*** Authority First® ***Post:*** 1 qt/ac Liberty®
**Foliar Insecticides:** Hero® with fungicide
**Foliar Fungicides:** 8 oz/ac Delaro®
**Fertilizer:** None

**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** Previous on-farm research in Nebraska has demonstrated that soybean planting rates of 80,000 to 120,000 seeds/ac resulted in the highest profitability. The purpose of this study was to evaluate the impact of seeding rates on the grower operation. Three seeding rates were evaluated: 100,000 seeds/ac, 125,000 seeds/ac, and 150,000 seeds/ac (grower rate). Treatments were randomized and replicated in field-length strips. Yield monitor data were collected at the end of the growing season and post-processed to remove errors. Stand counts were taken one month after planting in each replication.

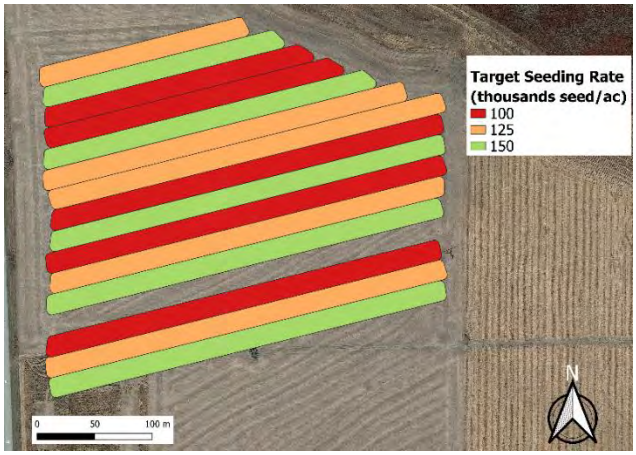



**Figure 1:** Treatment design with strip trials of 100,000, 125,000, and 150,000 target populations.

**Results:**

| | Stand Counts (plants/acre) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| 100,000 seeds/ac | 94,541 A* | 8.3 A | 86 A | 888 A |
| 120,000 seeds/ac | 103,306 A | 8.3 A | 79 A | 796 A |
| 150,000 seeds/ac | 114,900 A | 8,3 A | 83 A | 819 A |
| P-Value: | 0.18 | 0.46 | 0.45 | 0.40 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, $38.6/ac cost of 60,000 seeds/ac, $47.4/ac cost of 80,000 seeds/ac, $59.3/ac cost of 100,000 seeds/ac, and $71.1/ac cost of 120,000 seeds/ac.

**Summary:**

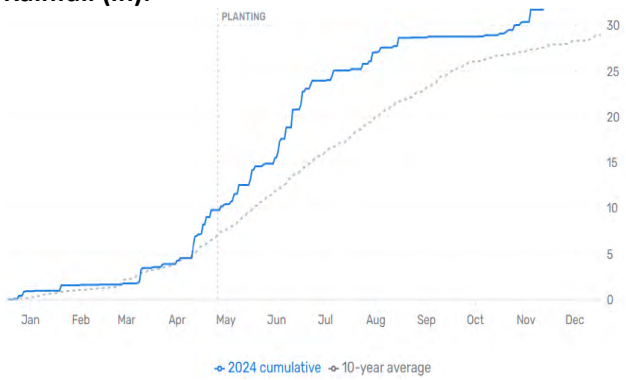
- No significant differences were found in stand counts, moisture, yield or marginal net return between the three target populations.

# Irrigated Soybean Population Study

**Study ID:** 1528011202401
**County:** Boone
**Soil Type:** Hall silt loam 0-1% slope
**Planting Date:** 5/10/24
**Harvest Date:** 10/10/24
**Population:** Variable
**Row Spacing (in):** 30”
**Variety:** Asgrow® AG27XF3
**Reps:** 6
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 8.5 oz/ac Authority Supreme® + 12 oz/ac Sterling Blue® ***Post:*** 1.3 pt/ac Charger Basic® + 42 oz/ac Liberty® + 30 oz/ac Roundup PowerMAX® + 12 oz/ac Section 3®
**Foliar Insecticides:** 2.8 oz/ac Leverage 360®
**Foliar Fungicides:** 8 oz/ac Delaro®

**Fertilizer:** 100 lb/ac 11-52-0 + 100 lb/ac MESZ (12-40-10-1) + 5 lb/ac 15% Boron

**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** Previous on-farm research in Nebraska has demonstrated that soybean planting rates of 80,000 to 120,000 seeds/ac resulted in the highest profitability. In 2023, this producer investigated the impact of reducing his main rate (140,000 seeds/ac) to a lower rate (115,000 seeds/ac), and observed that the reduced rate did not influence soybean yield, therefore profitability increased. In 2024, the same grower wanted to expand the trial and tried multiple rates. His goal was to determine the lowest seeding rate that will return the maximum profitability. Treatments were seeding rates of 60,000, 80,000, 100,000, and 120,000 seeds/ac.

**Results:**

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| 60,000 seeds/ac | 8.1 A* | 82 A | 868 A |
| 80,000 seeds/ac | 7.9 A | 81 A | 844 AB |
| 100,000 seeds/ac | 8.1 A | 81 A | 835 AB |
| 120,000 seeds/ac | 8.0 A | 80 A | 814 B |
| P-Value | 0.19 | 0.49 | 0.04 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, $38.6/ac for cost of 60,000 seeds/ac, $47.4/ac cost of 80,000 seeds/ac, $59.3/ac cost of 100,000 seeds/ac, and $71.1/ac cost of 120,000 seeds/ac.

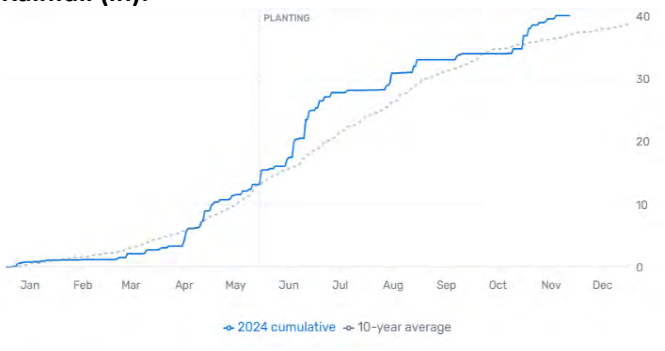
**Summary:**

- No significant differences were found in moisture or yield between the four target populations.
- Planting a target population of 60,000 seeds/ac resulted in a higher marginal net return ($868/ac) than 120,000 seeds/ac ($814/ac).

# Non-Irrigated Soybean Population Study

**Study ID:** 0510147202402
**County:** Richardson
**Soil Type:** Nodaway silt loam
**Planting Date:** 5/29/24
**Harvest Date:** 10/14/24
**Population:** Variable
**Row Spacing (in):** 15”
**Hybrid:** Pioneer® P37A18E
**Reps:** 6
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 8 oz/ac Authority Supreme® + 21oz/ac glyphosate + 12.8oz/ac Zaar ® + 16oz/ac 2,4-D ***Post:*** 32oz/ac Enlist One® + 24 oz/ac glyphosate + 2.5 pt/ac Warrant® + 12.8 oz/ac clethodim + 12.8 oz/ac Zaar®

**Seed Treatment:** Pioneer® Seed Treatments
**Foliar Insecticides:** 1.5 oz/ac Province II® + 1.5oz/ac Brigade® applied at R3 with fungicide
**Foliar Fungicides:** 3 oz/ac propiconazole + 3 oz/ac Priaxor®
**Fertilizer:** March variable rate of 45 lb MAP/acre + 96 lb potash/acre + 52 lb gypsum/acre
**Irrigation:** None
**Rainfall (in):**




**Introduction:** Finding the optimal soybean seeding rate may vary from field to field. The goal of this study was to find the optimal seeding rate between three target amounts: 80,000 seeds/ac, 110,000 seeds/ac, and 140,000 seeds/ac. Yield/ac was gathered from a yield monitor and cleaned to adjust for any outliers. Six replications were done in this study.

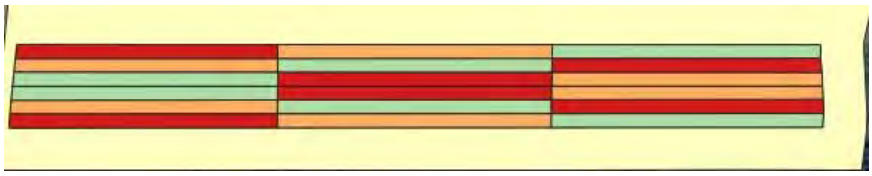


**Figure 1:** Project Design and Layout. Red plots are 80,000 seeds/ac, orange plots are 110,000 seeds/ac or 130,000 seeds/ac, and green plots are 140,000 seeds/ac.

**Results:**

| Target Population | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|
| 80,000 seeds/acre | 66 B* | 656 B |
| 110,000 seeds/acre | 71 A | 701 A |
| 140,000 seeds/acre | 72 A | 703 A |
| P-Value: | 0.004 | 0.04 |

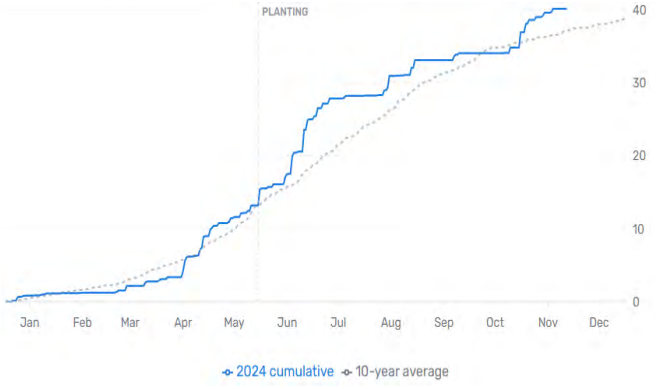
*Values with the same letter are not significantly different at a 90% confidence level
† Bushels per acre are corrected to 13% moisture
‡ Marginal Net Return based on $11/bu soybeans, $91.03/ac cost for 140,000 seeds/ac, $75/ac cost for 110,000 seeds/ac, and $58.03/ac cost for 80,000 seeds/ac.

**Summary:**

- There were significant differences in yield and marginal net return among the treatments.
- Yield was highest when planting at 110,000 seeds/ac (71 bu/ac) and 140,000 seeds/ac (72 bu/ac) compared to planting at 80,000 seeds/ac (66 bu/ac)
- Marginal net return was highest when planting 110,000 seeds/ac ($701/ac) and 140,000 seeds/ac ($703/ac) when compared against planting 80,000 seeds/ac ($656/ac).

# Soybean Burndown Herbicide Comparison

**Study ID:** 0510147202401
**County:** Richardson
**Soil Type:** Nodaway silt loam
**Planting Date:** 5/9/24
**Harvest Date:** 10/14/24
**Population:** 130,000
**Row Spacing (in):** 30”
**Hybrid:** Pioneer® P37A18E
**Reps:** 3
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** (8 oz/ac Authority Supreme® *Or* 21 oz/ac Zidua Pro®) + 16 oz/ac Zaar® + 2,4-D + 12.8 oz/ac Roundup PowerMAX® ***Post:*** 32 oz/ac Enlist One® + 24 oz/ac glyphosate + 2.5 pt/ac Warrant® + 12.8 oz/ac clethodim + 12.8 oz/ac Zaar®
**Foliar Insecticides:** 1.5 oz/ac Province II® + 1.5 oz/ac Brigade® (Applied at R3)
**Foliar Fungicides:** 3 oz/ac propiconazole + 3 oz/ac Priaxor®
**Fertilizer:** March variable rate: 45 lb/ac MAP, 96 lb potash/ac, 52 lb gypsum/ac
**Irrigation:** None
**Rainfall (in):**




**Introduction:**

Authority Supreme® and Zidua Pro® are two residual herbicides labeled in soybeans that provide long lasting weed control. Authority Supreme® (FMC™ Corporation) is a premix combination of two active ingredients, sulfentrazone (Group 14) + pyroxasulfone (Group 15). This premix is labeled for control of both broadleaves and grass species. Zidua Pro® (BASF Agriculture™) contains pyroxasulfone, saflufenacil (group 14), and imazethapyr (group 2). These two herbicides were tested to determine early season weed control in soybeans in a no-till cropping system.

**Figure 1:** Project Design. Yellow Treatments: Authority Supreme®. Blue Treatments: Zidua Pro®.

**Results:**

| Herbicide Program | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|
| Authority Supreme® | 74 A* | 794 A |
| Zidua Pro® | 74 A | 791 A |
| P-Value: | 0.90 | 0.79 |

*Values with the same letter are not significantly different at a 90% confidence level
† Bushels per acre are corrected to 13% moisture
‡ Marginal Net Return based on $11/bu soybean, Authority Supreme® cost of $19.05/ac, and Zidua Pro® cost $22.47/ac.

**Summary:**

- There were no significant differences in yield or marginal net return between the two herbicide treatments.
- Weed pressure and herbicide efficacy may depend on field history and emergence patterns.

# Soybean Tillage Study

**Study ID:** 0510147202403
**County:** Richardson
**Soil Type:** Haynie Silt Loam; deep loess, 0-2% slope
Leta silty clay, 0-2% slope
**Planting Date:** 5/29/24
**Harvest Date:** 10/14/24
**Population:** 130,000 seeds/ac
**Row Spacing (in):** 15”
**Hybrid:** Pioneer® P37A18E
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** Variable
**Herbicides:** ***Pre:*** 8 oz/ac Authority Supreme® + 21 oz/ac glyphosate + 12.8oz/ac Zaar® + 16oz/ac 2,4-D
***Post:*** 32 oz/ac Enlist One® + 24 oz/ac glyphosate + 2.5 pt/ac Warrant® + 12.8 oz/ac clethodim + 12.8 oz/ac Zaar®
**Foliar Insecticides:** 1.5 oz/ac Province II® + 1.5 oz/ac Brigade® applied at R3 with fungicide
**Foliar Fungicides:** 3 oz/ac propiconazole + 3 oz/ac Priaxor®
**Fertilizer:** March variable rate of 45 lb MAP/acre + 96 lb potash/acre + 52 lb gypsum/acre
**Irrigation:** None
**Rainfall (in):**


**Introduction:** This study was designed to test the effectiveness of tillage following corn harvest in the fall. Tillage can be an effective way to incorporate corn stalks after harvest or help reduce fall weed pressure. According to the 2024 UNL crop budget, the cost of the tillage pass was estimated at $23.25/ac, and this value was used to estimate marginal net return.

**Figure 1:** Project Design and Layout. Light green: no-till. Dark green: Tillage

**Results:**

| Treatment | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|
| No Tillage | 76 A* | 841 A |
| Fall Tillage | 77 A | 825 A |
| P-Value: | 0.34 | 0.12 |

*Values with the same letter are not significantly different at a 90% confidence level
† Bushels per acre are corrected to 13% moisture
‡ Marginal Net Return based on $11/bu soybeans, tillage cost of $23.25/ac.

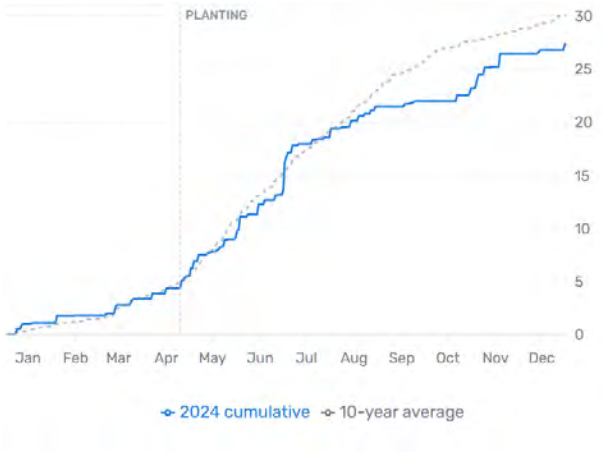
**Summary:**

- There were no significant differences in yield or marginal net return between treatments.
- No significant yield difference was associated with either fall tillage (77 bu/acre) or no tillage (76 bu/acre).
- Furthermore, no significant difference was found in marginal net return between the two systems ($825/ac and $841/ac).
- Tillage has benefits/drawbacks not noted in this study.

# Corn Population Study

**Study ID:** 1348187202502
**County:** Seward
**Soil Type:** Hastings silt loam; Hastings silty clay loam
**Planting Date:** 4/24/24
**Harvest Date:** 10/4/24
**Population:** Variable
**Row Spacing (in):** 30”
**Variety:** Pioneer® 1170AM
**Reps:** 4
**Previous Crop:** Soybean
**Tillage:** Strip-till
**Herbicides:** ***Pre:*** 44 oz/ac glyphosate applied 4/10/24. 2 qt/ac Harness Xtra® + 4.5 oz/ac Explorer® + 32 oz/ac glyphosate. ***Post:*** 1 qt/ac Degree Xtra® + 3 oz/ac Explorer® + 30 oz/ac Roundup PowerMAX®
**Foliar Fungicides & Insecticides:** 13.7 oz/ac Trivapro® + 6.4 oz/ac Bifenthrin® 2 AG Gold applied 7/16/24.

**Fertilizer:** 100 lb/ac MESZ (10-40-10-1) applied 3/21/24. 50 lb/ac N (urea) applied 3/21/24. 15 lb N/ac applied 4/10/24. 89 lb/ac N 32-0-0 applied 6/7/24. 3 gal/ac Thiosul applied 6/7/24. 13 lb N/ac (nitrate water credit) pumped through irrigation.
**Irrigation:** Pivot, Total: 7.15”
**Rainfall (in):**




**Introduction:** This producer was interested in determining any potential yield and economic differences in varying corn seeding rates. The grower chose to compare rates of 29,000, 31,000, and 33,500 seeds/ac. Rye was planted in this field in the fall of 2023. On 4/10/24, the rye was terminated with glyphosate + 15 lb N/ac prior to planting on 4/24/24. The grower noted that corn emergence was not uniform due to the rye residue, and he had challenges achieving uniform planting depth, all of which may have impacted yields. However, this was observed across the entire field and not with any specific treatment. Harvest stand counts and percent stalk rot were taken in each treatment and rep on October 2, 2024.

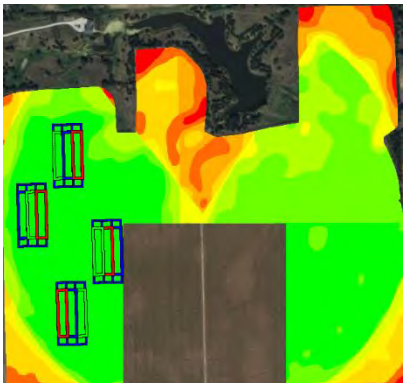


**Figure 1:** Project layout and design

**Results:**

| | Stand Counts (plants/acre) | Stalk Rot (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| 29,000 seeds/ac | 28,000 B* | 2.5 A | 240 A | 954 A |
| 31,000 seeds/ac | 31,000 A | 4.3 A | 244 A | 938 A |
| 33,500 seeds/ac | 33,375 A | 5.6 A | 255 A | 976 A |
| P-Value | 0.004 | 0.34 | 0.1 | 0.44 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $115/ac 29,000 seeds/ac, $123/ac 31,000 seeds/ac, $133/ac 33,500 seeds/ac

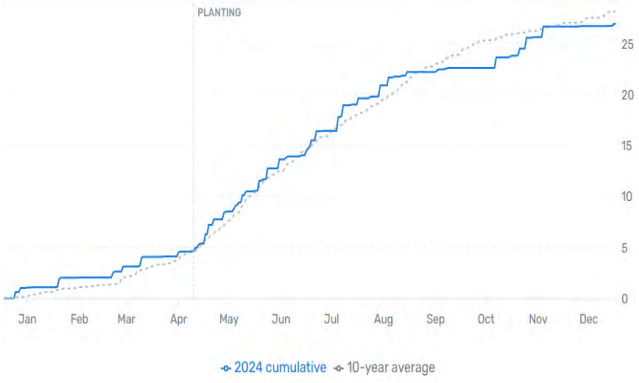
**Summary:**

- There were significant differences in stand counts between treatments.
- There were no significant differences in stalk rot, yield or marginal net return between the three target populations.

# Corn Hybrids and Planting Population

**Study ID:** 1538001202401
**County:** Adams
**Soil Type:** Hastings silt loam
**Planting Date:** 4/24/24
**Harvest Date:** 10/18/24
**Population:** Variable
**Row Spacing (in):** 36”
**Variety:** Variable
**Reps:** 6
**Previous Crop:** Soybean
**Tillage:** No-Till
**Herbicides:** ***Pre:*** glyphosate + atrazine + Trivolt® + dicamba ***Post:*** glyphosate + Harness Max® + atrazine + DiFlexx®
**Seed Treatment:** Company standard
**Foliar Insecticides:** None
**Foliar Fungicides:** 8 oz/ac Delaro Complete® + 5 oz/ac Hero applied on 7/17/24. 10.5 oz/ac Quilt® Xcel applied on 8/15/24.

**Fertilizer:** 200 lbs/ac 11-52-0 + 31 lbs/ac 90% Agrisol®
**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:**

The selection of a corn hybrid that is grown in a specific field can affect the harvested yield. In addition, hybrids can respond differently to the number of seeds that are planted. Thus, it is important to test the combination of hybrid and planting rate for specific farm conditions. Two corn hybrids were planted in a paired comparison at three different populations in an irrigated field in Adams County, Nebraska. Each half of the planter was loaded with a different hybrid and the seeding rate was changed with each full pass through the field. Each treatment combination was replicated six times.

**Results:**

| | Target Population | Stand Counts (plants/acre) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| DEKALB® DKC62-89 | 32,000 seeds/ac | 31,167 C* | 14.0 A | 260 B | 1014 A |
| | 36,000 seeds/ac | 35,667 B | 14.0 A | 267 A | 1027 A |
| | 40,000 seeds/ac | 37,833 A | 14.0 A | 269 A | 1023 A |
| P-Value: | | <0.001 | 0.56 | 0.001 | 0.26 |
| Fontanelle® 13DT621 | 32,000 seeds/ac | 31,833 C | 14.7 A | 252 B | 973 A |
| | 36,000 seeds/ac | 35,500 B | 14.7 A | 254 AB | 968 A |
| | 40,000 seeds/ac | 39,500 A | 14.7 A | 256 A | 963 A |
| P-Value: | | <0.001 | 0.94 | 0.03 | 0.34 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, DEKALB® DKC62-89 seed cost: 32,000 seeds/ac- $118/ac, 36,000 seeds/ac- 132.75/ac, 40,000 seeds/ac 147.50/ac. Fontanelle® 13DT621 seed cost: 32,000 seeds/ac- $122/ac, 36,000 seeds/ac- $137.25/ac, 40,000 seeds/ac- $152.50/ac.

**Summary:**

- There were significant differences between stand count and yield for both hybrids.
- Planting DEKALB® DKC62-89 at a target seeding population of either 36,000 or 40,000 seeds/ac yielded higher (267 bu/ac; 269 bu/ac) than at a seeding rate of 32,000 seeds/ac (260 bu/ac) With this, marginal net return was similar between the three target populations when planting this variety.
- Planting Fontanelle® 13DT621 at 40,000 seeds/ac yielded higher than at 32,000 seeds/ac.
- There were no significant differences for moisture or marginal net return for either hybrid or any of the treatments, indicating increasing seeding rates improved yields but did not overcome the increased seed costs
- Further research is needed to determine optimum seeding rates for hybrids in different conditions.

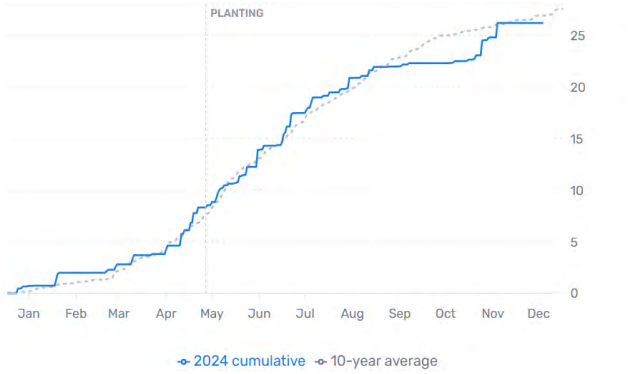


# FERTILITY + SOIL MANAGEMENT

# Adding Pelletized Lime and Ammonium Sulfate in Soybean- Year 2

**Study ID:** 1051081202402
**County:** Hamilton
**Soil Type:** Hastings silt loam
**Planting Date:** 4/24/24
**Harvest Date:** 10/8/24
**Population:** 100,000
**Row Spacing (in):** 15”
**Variety:** Beck’s® 2950E3
**Reps:** 6, 9 (2023); 8 (2024)
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 8 oz/ac 2,4-D + 4 oz/ac Anthem Maxx® + 32 oz/ac glyphosate + AMS
***Post:*** 32 oz/ac Enlist® + 38 oz/ac Liberty® + 32 oz/ac glyphosate + AMS
**Seed Treatment:** Company standard

**Foliar Insecticides:** 8 oz/ac Capture®
**Foliar Fungicides:** 10 oz/ac Quilt®
**Fertilizer:** 16.5 lb N/ac, 74 lb P/ac, 72 lb K/ac, 4.5 lb S/ac, 3 lb Zn/ac
**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** The two-year study evaluated the impact of pelletized lime and ammonium sulfate as a calcium and sulfur source on a Hastings silt loam soil. Grower initally wanted to evaluate gypsum, but had to substitute pellitized lime and ammonium sulfate due to avai´lability. The fertilizer was applied with a dry broadcast spreader in mid-April 2023 and corn (2023)/soybean (2024) were no-till planted. The nitrogen and sulfur rates were adjusted to keep the rates the same as that applied to the check strips. The treatments were as follows:

- Check – grower standard fertilizer.
- Applied grower standard + 200 lb Pell Lime/ac + 150 lb ammonium sulfate/ac.

Grain moisture, yield, and marginal net return were evaluated. The variety was Beck’s® 2950 E3. This is the second year of a two-year study. In year two, no additional applications were made, and yield and net return impacts will be evaluated. The cost of the product is spread over two years.

**Results:** Year 1 (2023) results in corn field trials

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| | | *DEKALB® DKC114-01 White (9 replications)* | |
| Check | 19.0 A* | 229 A | 1355 A |
| Pelletized Lime + Ammonium Sulfate | 18.9 A | 232 A | 1362 A |
| P-Value: | 0.289 | 0.289 | 0.634 |
| | | *DEKALB® DKC1474 White (6 replications)* | |
| Check | 19.5 A | 235 A | 1389 A |
| Pelletized Lime + Ammonium Sulfate | 19.5 A | 242 A | 1419 A |
| P-Value: | 0.972 | 0.447 | 0.555 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, $9.11/ac lime + ammonium sulfate (cost was spread over two years).

Year 2 (2024) results in soybean field.

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Check | 9.8 A* | 84.8 A | $932 A |
| Pelletized lime + Ammonium Sulfate | 9.7 A | 85.6 A | $932 A |
| P-Value: | 0.97 | 0.87 | 0.99 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, $9.11/ac lime + ammonium sulfate (cost was spread over two years).

**Summary:**

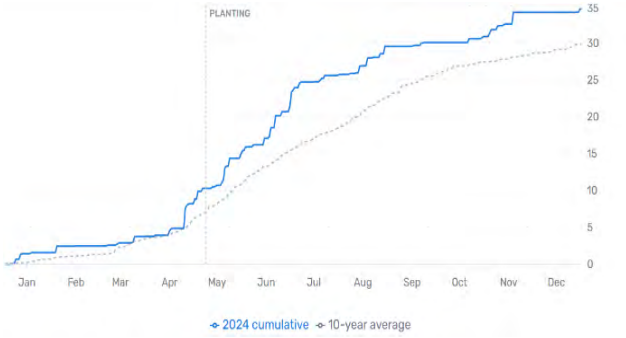
- There were no significant differences in moisture, yield, or marginal net return in either year regardless of crop.
- Soil series and health may play a factor in determining whether to apply additional lime + ammonium sulfate as a calcium source.

# Adding Pelletized Lime + Ammonium Sulfate in Corn - Year 2

**Study ID:** 1051081202401
**County:** Hamilton
**Soil Type:** Thurman fine sandy loam; Ortello fine sandy loam
**Planting Date:** 5/8/24
**Harvest Date:** 10/18/24
**Population:** 34,000
**Row Spacing (in):** 30”
**Hybrid:** Beck’s® 6046PQ & 6373 Conventional
**Reps:** 11
**Previous Crop:** Soybean
**Tillage:** No-till
**Herbicides:** ***Pre:*** 8 oz/ac 2,4-D + 4 oz/ac Anthem Maxx® + 32 oz/ac glyphosate + AMS ***Post:*** 5 oz/ac Status ® + 16 oz/ac Outlook® + 48 oz/ac atrazine + 4 oz/ac Callisto®

**Seed Treatment:** Company standard
**Foliar Insecticides:** None
**Foliar Fungicides:** 8 oz/ac Veltyma® (Applied at VT)
**Fertilizer:** 205 lb N/ac, 40 lb P/ac, 10 lb S/ac

**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** The two-year study evaluated the impact of pelletized lime and ammonium sulfate as a calcium and sulfur source on a Thurman and Ortello fine sandy loam soil in the Platte River Valley. The farmer initally wanted to evaluate gypsum, but had to substitute pellitized lime and ammonium sulfate due to availability. The fertilizer was applied with a dry broadcast spreader in mid-April 2023 and soybean (2023)/Corn (2024) were no-till planted. The nitrogen and sulfur rates were adjusted to keep the rates the same as that applied to the check strips. In year 1 (2023), there were 4 replications of pelletized lime + ammonium sulfate in soybean hybrid Paloma® 2E260, and 5 replications in soybean hybrid Beck’s® 2630. In year 2 (2024), only one corn hybrid was evaluated. The treatments were as follows:

- Check – grower standard fertilizer applied with dry spreader.
- Applied grower standard plus 200 lb pelletized lime/ac and 150 lb ammonium sulfate/ac.

Grain moisture, yield, and marginal net return were evaluated for two hybrids, Beck’s® 6046PQ and 6373. This is the second year of a two-year study. In year two, no additional applications were made, and yield and net return impacts were evaluated. The product cost is spread over two years.

**Results:**

2024 (year 2) results in corn field.

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Check | 16.3 A* | 242 A | 1,054 A |
| Pelletized lime + Ammonium Sulfate | 15.7 A | 244 A | 1,027 A |
| P-Value: | 0.45 | 0.72 | 0.1 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybean and $32.7/ac for the pelletized lime and ammonium sulfate.

**Year 1 (2023) Results**

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| | *Paloma® 2E260 (4 replications)* | | |
| Check | 10.9 A* | 88.9 A | 1222.80 A |
| Pelletized Lime + Ammonium Sulfate | 10.9 A | 88.7 A | 1188.50 A |
| P-Value: | 0.762 | 0.929 | 0.132 |
| | *Beck's® 2630 (5 replications)* | | |
| Check | 11.1 A | 85.8 A | 1180.20 A |
| Pelletized Lime + Ammonium Sulfate | 11.4 A | 86.9 A | 1162.40 A |
| P-Value: | 0.436 | 0.262 | 0.194 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $13.76/bu soybean and $9.11 for the pelletized lime and ammonium sulfate

**Summary:**

- There were no significant differences between moisture, yield, or marginal net returns in either soybeans (2023, year 1) or corn (2024, year 2).
- Soil series and health may play a factor in determining whether to apply additional lime + ammonium sulfate as a calcium and sulfur source.

# Evaluating Nitrogen Rates in Wheat

**Study ID:** 0656127202401
**County:** Nemaha
**Soil Type:** Pohocco silty clay loam 6-11% slopes, eroded; Gymer silty clay loam 6-11% slopes, eroded
**Planting Date:** 10/01/23
**Harvest Date:** 6/25/24
**Population:** 1,500,000
**Row Spacing (in):** 7.5”
**Variety:** WestBred®
**Reps:** 4
**Previous Crop:** Soybean
**Tillage:** No-Till
**Foliar Fungicides:** Miravis® Ace
**Fertilizer:** 30 lb N/ac, 30.03 lb/ac potash, 50 lb P/ac, and 7.5 lb S/ac applied pre-plant.

**Note:** Some freeze damage
**Irrigation:** None
**Rainfall (in):**


**Introduction:** This study evaluated two different N rates of Urea broadcast in Winter Wheat against an untreated check that has only 30 lb N/ac as base rate for all treatments. The three different N rates evaluated in this study were 30, 45, and 90 lb N/ac applied by broadcasting urea in a mid-season application (Figure 1). The application width was 80’ wide.

**Figure 1:** Prescription Map of Urea Applications

**Results:**

| Treatment | Moisture (%) | Yield (bu/ac)† | Partial factor profit (lb bu/ lb N) | lb N/bu | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| 30 lb N/ac total (0 lb N/ac urea) | 7.7 A* | 56 A | 111.9 A | 0.54 C | 370 A |
| 75 lb N/ac total (45 lb N/ac urea) | 8.2 A | 59 A | 46.7 B | 1.3 B | 327 A |
| 120 lb N/ac total (90 lb N/ac urea) | 8.5 A | 60 A | 29.8 C | 2.1 A | 275 B |
| P-value: | 0.019 | 0.23 | <0.001 | <0.001 | 0.10 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13.5% moisture.
‡Marginal net return based on $6.60/bu wheat, and $0.60 lb N/lb

**Summary:**

- There were no significant differences in moisture or yield between treatments.
- There was a significant difference in marginal net return, with the 30 and 75 lb N/ac rates having a higher net return than the 120 lb N/ac rate.
- Freeze damage may have reduced stand count which could have impacted N uptake.
- This study suggests that the lowest N rate may have been appropriate for this field in 2024.

# Evaluating Nitrogen Rates in Corn

**Study ID:** 1537021202402
**County:** Burt
**Soil Type:** Blyburg silt loam; Owego silty clay
**Planting Date:** 5/16/24
**Harvest Date:** 10/17/24
**Population:** 34,000
**Row Spacing (in):** 30”
**Hybrid:** DEKALB® DKC62-89
**Reps:** 4
**Previous Crop:** Soybean
**Herbicides:** ***Pre:*** 14 oz/ac Trivolt® + 12 oz/ac 2,4-D + 1 qt/ac atrazine applied on 5/17/24, mixed with fertilizer
**Foliar Insecticides:** None
**Foliar Fungicides:** None

**Fertilizer:** 35 lb N/ac 32-0-0 before tassel fertigation, 35 lb N/ac 32-0-0 after tassel fertigation
**Irrigation:** Pivot
**Rainfall (in):**


**Introduction:** This study evaluated a lower nitrogen rate right after planting on irrigated corn compared to the grower’s traditional nitrogen rate. The two sidedress rates were 120 lb N/ac and 150 lb N/ac. Two separate fertigation events occurred, applying 10 gal/ac resulting in 70 lb N/ac through fertigation, resulting in 190 lb N/ac total and 220 lb N/ac total. Yield monitor data were collected at the end of the growing season and cleaned to remove errors.

**Results:**

| Treatment | Moisture (%) | Yield (bu/ac)† | Partial factor productivity lb grain/lb N | NUE (lb N/bu) | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| 190 lb N/ac (reduced) | 14.9 A* | 254 A | 74.9 A | 0.75 B | 1,039 A |
| 220 lb N/ac | 14.8 A | 248 A | 63.1 B | 0.89 A | 996 A |
| P-value: | 0.67 | 0.26 | 0.003 | 0.002 | 0.12 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $66/ac cost 120 lb N/ac (32-0-0), $82/ac cost 150 lb N/ac (32-0-0).

**Summary:**

- There were no significant differences between moisture, yield, or marginal net return between treatments.
- This indicates a reduction in total N applied was possible while maintaining yields in this situation.

# Evaluating Nitrogen Rates in Corn

**Study ID:** 1528011202402
**County:** Boone
**Soil Type:** Nora silt loam 6-11% slopes, eroded
**Planting Date:** 5/17/24
**Population:** 34,000
**Row Spacing (in):** 30”
**Hybrid:** DEKALB® DKC62-89RIB
**Reps:** 4
**Previous Crop:** Soybean
**Tillage:** No-Till
**Herbicides:** ***Pre:*** 5 pt/ac 2,4-D + 8 oz/ac Sterling Blue® + 30 oz/ac Roundup PowerMAX® + 2.5 qt/ac Degree Xtra® + 2.5 oz/ac Balance Flex® ***Post:*** 2.1 qt/ac Acuron® + 30 oz/ac Roundup PowerMAX®
**Foliar Insecticides:** 6.4 oz/ac Tundra® EC
**Foliar Fungicides:** 8 oz/ac Delaro®

**Fertilizer:** 5 gal/ac starter (10-34-0), 100 lb/ac (11-52-0), 100 lb/ac MESZ (12-40-10), 5 lb/ac boron
**Irrigation:** Pivot
**Rainfall (in):**


**Introduction:** This study evaluated the impact of reduced N rate applied at V4-V5 sidedress. Prior to in-season N application, all treatments received 200 lb N/ac from a spring anhydrous application . One treatment, which was the grower standard, had an additional 50 lb N/ac applied during sidedress application fertilizer (32%-0-0) at V4-V5 corn growth stage. This was compared against a reduced N rate of 200 lbs N/ac which was achieved by not applying the sidedress application. The traditional rate of N applied was 250 lb/ac.

**Results:**

| Treatment | Moisture (%) | Yield (bu/ac)† | Partial factor productivity (lb grain/ lb N) | NUE (lb N/ bu) | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| 200 lb N/acre | 18.4 A* | 269 A | 63.4 A | 0.88 B | 1,171 A |
| 250 lb N/acre (50 lb N/ac sidedress) | 18.1 A | 272 A | 50.9 B | 1.1 A | 1,151 A |
| P-Value: | 0.16 | 0.68 | 0.006 | 0.0013 | 0.56 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.30/bu corn and $0.60/N dry fertilizer.

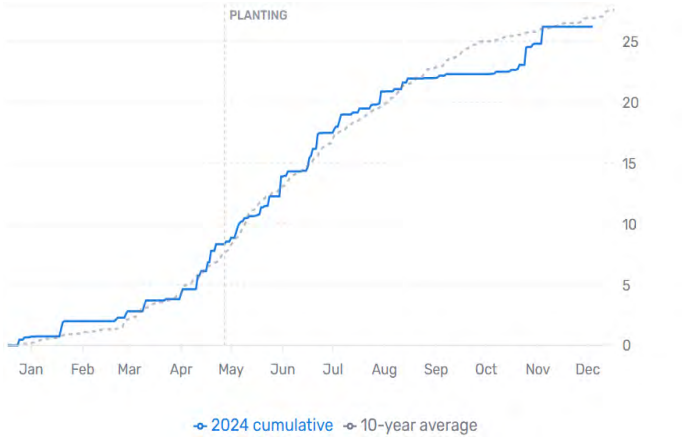
**Summary:**

- There were no significant differences in moisture, yield or marginal net return between treatments.
- If the regular practice for this site to apply 250 ln N/ac, a reduction of 25% in the N rate would have no yield penalty for this growing season.
- Further testing should be conducted to find the optimal N rate in this field.

# Evaluating Nitrogen Rates in Corn

**Study ID:** 1532159202401
**County:** Kearney
**Soil Type:** Holdrege silt loam, 0-1% slopes
**Planting Date:** 4/24/24
**Harvest Date:** 10/20/24
**Population:** Unknown
**Row Spacing (in):** 30”
**Hybrid:** Pioneer® 1170AM
**Reps:** 4
**Previous Crop:** Soybean
**Tillage:** No-till
**Herbicides:** ***Pre:*** 2.5 oz/ac Anthem Maxx®, 12 oz/ac dicamba, 20 oz/ac Roundup PowerMAX® 3, 1% v/v COC, and 17 lb/100lb AMS.
***Post:*** 1.5 pt/ac Dual Magnum®, 12 oz/ac DiFlexx®, 3 oz/ac mesotrione, and 20 oz/ac Roundup PowerMAX® 3.
**Foliar Insecticides:** 3 oz/ac bifenthrin applied in-furrow

**Fertilizer:** 120 lb N/ac as anhydrous ammonia with inhibitor and 14 gal/ac 10-34-0 applied in the fall. 3 gal/ac 10-34-0 applied in-furrow at planting.
**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** This study evaluated the impact of different nitrogen rates at sidedress. The farmer’s typical sidedress rate is 23 gal/ac, resulting in a total of 220 lb N/ac.

1) Total rate of 149 lb N/ac

2) Total rate of 177 lb N/ac

3) Total rate of 204 lb N/ac

3) Total rate of 231 lb N/ac

Agronomical optimal N rate (AONR) and Economical Optimal N Rate (EONR) were calculated to find N rate values for the data.

**Baseline Soil Samples 0-8” (October 2023):**

| pH | OM LOI % | Nitrate–N ppm N | Mehlich 3 ppm P | K ppm | Mg ppm | Na ppm |
|---|---|---|---|---|---|---|
| 7.6 | 2.6 | 5.1 | 85 | 11.7 | 294 | 35 |
| 7.2 | 2.7 | 3.4 | 25 | 9.4 | 194 | 38 |
| 7.2 | 2.5 | 3.0 | 19 | 13.3 | 195 | 42 |
| 7.2 | 2.4 | 2.5 | 14 | 11.4 | 241 | 44 |
| 7.2 | 2.6 | 3.9 | 12 | 11.1 | 245 | 42 |
| 6.9 | 2.8 | 2.8 | 43 | 25.0 | 285 | 47 |

**Results:**

| | Stand Counts (plants/acre) | Moisture (%) | Yield (bu/ac)† | PFP of N (lb grain/lb N) | lbs N/bu grain | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| 149 lb N/ac | 30,500 A* | 12.2 A | 252 AB | 97.8 A | 0.57 D | 1,067 A |
| 177 lb N/ac | 28,375 A | 12.3 A | 248 B | 81.4 B | 0.69 C | 1,040 A |
| 204 lb N/ac | 29,500 A | 12.3 A | 254 AB | 73.6 C | 0.76 B | 1,055 A |
| 231 lb N/ac | 28,500 A | 12.2 A | 256 A | 64.1 D | 0.87 A | 1,049 A |
| P-Value | 0.08 | 0.55 | 0.06 | <0.001 | <0.001 | 0.26 |

*Values with the same letter are not significantly different at a 90% confidence level.

†Bushels per acre corrected to 15.5% moisture.

‡Marginal net return based on $4.35/bu corn, 149 lb N/ac cost of $68.54, 177 lb N/ac cost of $81.42, 204 lb N/ac cost of $93.84, and 231 lbs N/ac cost of $106.26.

**Summary:**

- There were no significant differences in stand count or marginal net return between treatments.
- There was a significant difference in yield, although applying 149, 204 or 231 lb N/ac yielded the same in this study.
- The calculated AONR (181 lb N/ac) and EONR (211 lb N/ac) were lower than the grower's standard treatment (220 lb N/ac).
- This study shows there is room to fine-tune the N rate to optimize productivity and potentially reduce the environmental impact of N in the agriculture system.

# Evaluating Nitrogen Rates in Corn

**Study ID:** 0085141202403
**County:** Platte
**Soil Type:** Grigston silt loam
**Planting Date:** 5/01/24
**Harvest Date:** 9/27/24
**Population:** 35,000
**Row Spacing (in):** 30”
**Hybrid:** DEKBALB® DKC103-07
**Reps:** 5
**Previous Crop:** Corn
**Tillage:** Ridge-Till
**Herbicides:** ***Pre:*** PRE: 2 qt/ac Degree Xtra® + 3 oz Balance Flex® + 6 oz Sterling Blue + 28 oz Roundup PowerMAX®
**Seed Treatment:** Acceleron®
**Foliar Insecticides:** None
**Foliar Fungicides:** None

**Fertilizer:** Pre plant: 55 lb N/ac (3-18-24) Planting: 5 gal (6-24-6-1ZN) with 16 oz of micronutrients in furrow + 8 gal 32% + 2 gal ATS dribbled on top of furrow
**Irrigation:** Gravity
**Rainfall (in):**


**Introduction:** This study evaluated the impact of reduced N rates applied at sidedress. Prior to in-season N application, all treatments received 55 lb N/ac as urea (March 18) and 30 lb N/ac at planting (June 6). The total N applied before sidedress was 85 lb N/ac. Three treatments were established with the sidedress application on May 27.

Soil samples were collected at 0-1' and 1-2' and soil N and organic matter content were assessed. Total N credit was used to calculate the total N applied using the UNL N recommendation calculator. The numbers are given in the tables below.

**Figure 1: Soil test results and N credits**

| Soil OM \| OM N Credit | Irrigation Water N Credit | Soil N Credit | Soybean N Credit | Total N Credit | Yield Goal | UNL N Requirement |
|---|---|---|---|---|---|---|
| % \| N lbs/ac | N lbs/ac | N lbs/ac | N lbs/ac | N lbs/ac | bu/ac | N lbs/ac |
| 3.1 \| 111.7 | 3 | 15 | 40 | 169.6 | 275 | 365 |

**Figure 2: UNL suggested N and treatment application rates**

| UNL suggested N application | Applied N pre plant | Applied N at planting | Required N at sidedress application | Treatment 1 | Treatment 2 | Treatment 3 |
|---|---|---|---|---|---|---|
| N lbs/ac | N lbs/ac | N lbs/ac | N lbs/ac | N lb/ac | bu/ac | N lb/ac |
| 195.4 | 55 | 30 | 110.4 | 145 | 165 | 185 |

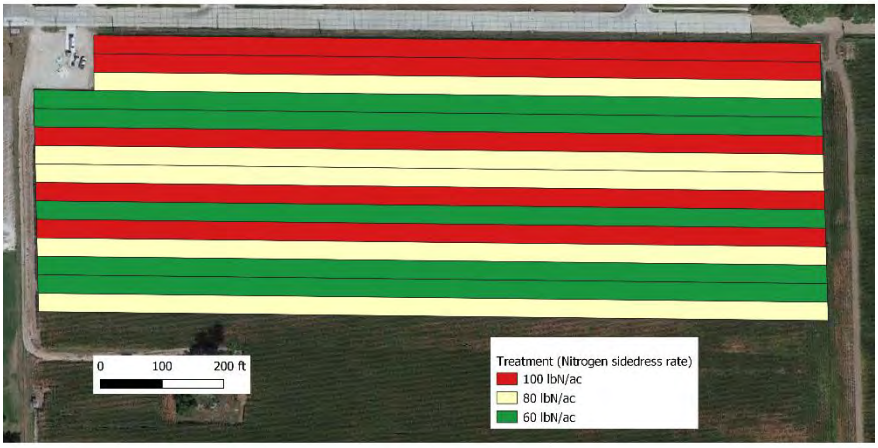



**Figure 3:** Project Design and Treatment Layout

**Results:**

| Treatment | Moisture (%) | Yield (bu/ac)† | Partial factor productivity lb grain/lb N | lb N/bu | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| 145 lbs N (60 lb N/ac) | 19.1 A* | 270 A | 88.5 A | 0.63 C | 1,143 A |
| 165 lbs N (80 lb N/ac) | 19.3 A | 269 A | 77.5 B | 0.72 B | 1,128 A |
| 185 lbs N (100 lb N/ac) | 19.1 A | 270 A | 69.6 C | 0.80 A | 1,125 A |
| P-value: | 0.60 | 0.88 | <0.001 | <0.001 | 0.39 |

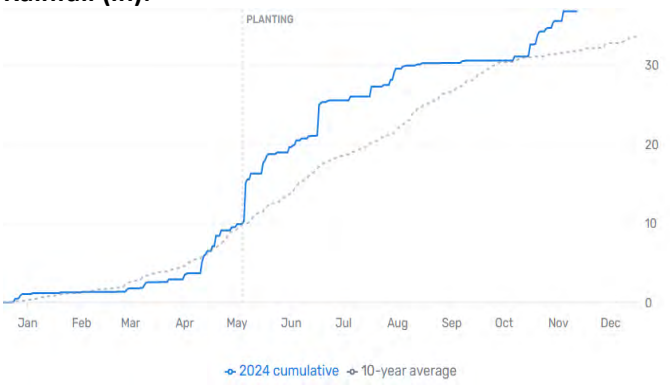
*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $30.6/ac 60 lb N/ac sidedress, $40.8/ac 80 lb N/ac sidedress, $51.0/ac 100 lb N/ac sidedress.

**Summary:**

- There were no significant differences for moisture, yield, or marginal net return between the treatments. Applying 145, 165, or 185 lb N /ac produced the same yield.
- Each unit of N applied in the first treatment produced more grain compared with each unit of treatment 2 and 3. The requirement of N per bushel of corn was reduced from 0.68 to 0.54 compared treatment 3 and 1 respectively.
- The findings also suggest that using the lowest amount of N lb/ac (145 lb) was appropriate for this field during 2024. Further testing should be conducted to determine the optimal N rate over years.

# Sensor-Based Nitrogen Management on Irrigated Corn

**Study ID:** 1524155202401
**County:** Saunders
**Soil Type:** Tomek silt loam
**Planting Date:** 5/18/24
**Harvest Date:** 10/25/24
**Population:** 34,500
**Row Spacing (in):** 30”
**Hybrid:** Pioneer® P1278Q
**Reps:** 5
**Previous Crop:** Corn
**Tillage:** Reduced Tillage
**Herbicides:** ***Pre:*** 1.6 qt/ac Harness Xtra® + 3 oz/ac Balance Flex® ***Post:*** 32 oz/ac Symbol Release® + 32 oz/ac atrazine + 3 oz/ac Laudis® + 22 oz/ac glyphosate + 9.5 oz/ac Superb® + 8 oz/ac Bountiful® + 20 oz/ac Interlock® + 24 oz/ac Class Act Ridion®
**Seed Treatment:** Base Pioneer® Seed Treatment
**Foliar Insecticides:** 5 oz/ac Battalion 2EC® + 2 oz/ac Wetcit® applied on 7/20/24
**Foliar Fungicides:** 7 oz/ac Veltyma® applied on 7/20/24
**Irrigation:** Pivot, Total: 5”
**Rainfall (in):**




**Introduction:** Corn nitrogen management may be improved by using sensors or imagery to account for within-field variability and respond to corn nitrogen needs during the growing season. This study used weekly aerial imagery obtained with a multispectral sensor on a quadcopter drone to determine the in-season nitrogen rate. This study compared the grower’s standard nitrogen treatment and a sensor-based nitrogen approach while also including a nitrogen rate ramp to determine the economic optimum nitrogen rate (EONR) for the field (after harvest).

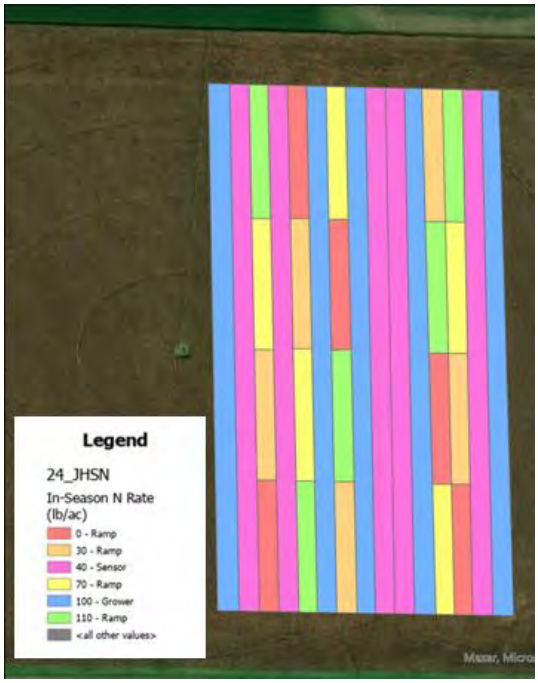



**Figure 1:** Project Design and Layout

**Grower Nitrogen Treatment*:*** The field received a target base rate of 120 lb N/ac as anhydrous ammonia on November 30, 2023, and a target flat rate of 100 lb N/ac as 32% UAN on July 7, 2024. The as-applied data showed that the average anhydrous ammonia rate was 121 lb N/ac and the average UAN rate was 99 lb N/ac for the grower treatment.

**Sensor Nitrogen Treatment:** The field had a target base rate of 120 lb N/ac as anhydrous ammonia applied on November 30, 2023. As-applied data showed that the average anhydrous ammonia rate was 120 lb N/ac. Aerial imagery was obtained with a multispectral sensor on a quadcopter drone to monitor the crop weekly from V6 to R5 growth stages. The imagery from July 6, 2024, was used to direct the in-season N application using the Holland-Schepers and UNL N algorithms. The sufficiency index was calculated from aerial imagery, and the UNL N algorithm (https://agritools.unl.edu/tools/nitrogen) was employed to generate an estimated optimum nitrogen rate input, which was required in the Holland-Schepers algorithm. Credits for the anhydrous ammonia were also taken into consideration in this algorithm. Based on the Holland-Schepers algorithm, the sensor application called for 32 lb N/ac on all sensor plots. However, to manage risk, the grower determined he wanted a minimum rate of 40 lb N/ac in-season on the sensor-based treatments, more than the sensor recommended rate. Therefore, the in-

season application of 40 lb N/ac was applied as 32% UAN on July 9, 2024, using a Hagie STS 12 with a coulter bar. As-applied data showed the average sensor-based in-season application was 41 lb N/ac.

**Nitrogen Rate Ramps:** During the in-season application, nitrogen rate ramps were also applied, with in-season N rates of 0, 30, 70, and 110 lb N/ac and were used to determine the economic optimum N rate (EONR) for the field to compare with the grower and sensor-based N rates. The treatment layout is shown in figure 1.

**Results:**

| Treatment | Total N Rate (lb/ac) | Moisture (%) | Yield (bu/ac)† | Partial Factor Productivity of N (lb grain/lb N) | NUE (lb N/bu grain) | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Grower | 220 A* | 14.7 A | 248 A | 63 B | 0.88 A | 984 B |
| Sensor | 161 B | 14.7 A | 247 A | 86 A | 0.65 B | 1,010 A |
| P-Value: | <0.001 | 0.88 | 0.78 | <0.001 | <0.001 | 0.08 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $0.38 NH3, and $0.50 32% UAN.

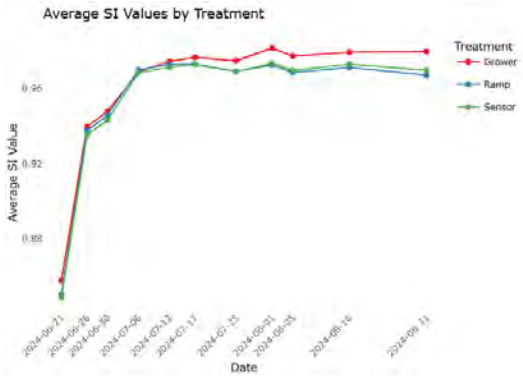



**Figure 3:** Average SI Values by Treatment

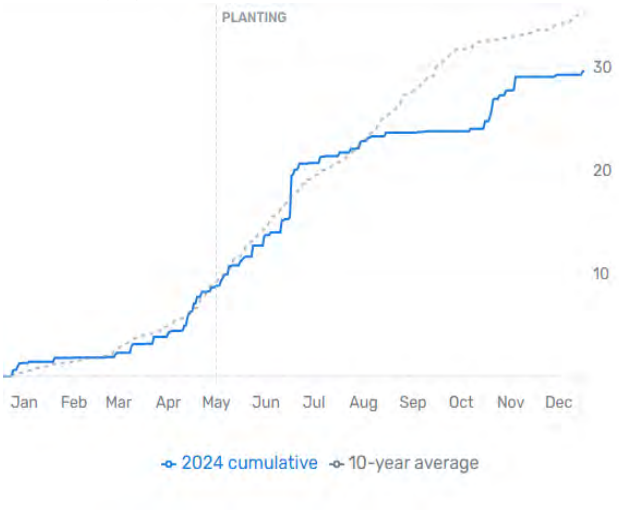
**Summary:**

- The sensor-based management N rate was 59 lb N/ac lower than the grower's traditional N management
- There were no differences in yield between the grower's traditional N management and the sensor-based management.
- Each unit of N applied by the sensor-based management produced 36% more grain (partial factor productivity of the fertilizer) compared to the grower management.
- Optimal N rates could not be fit using the N ramp treatments, suggesting using the lowest amount of N (120 lb N/ac).
- Marginal net return was $26/ac greater for the sensor-based N management.
- The economically optimal N rate (EONR) calculated after harvest (using the N ramp strips) for the field was 120 lb N/ac, with an estimated yield of 248 bu/ac. The EONR was 41 lb/ac lower than the sensor-based N rate and 100 lb/ac lower than the grower's traditional N management.
- Using a sensing technology capable of accounting for within-field and in-season variability, growers can produce corn more efficiently in terms of nitrogen and increase their profits, potentially reducing the environmental impact of N applications.

# Evaluating N Fertilizer in the Waverly Wellhead Protection Area

**Study ID:** 1545109202401
**County:** Lancaster
**Soil Type:** Aksarben silty clay loam; Judson silt loam
**Planting Date:** 5/15/24
**Harvest Date:** 10/14/24
**Population:** 28,500
**Row Spacing (in):** 30”
**Hybrid:** LG® 646C43
**Reps:** 3
**Previous Crop:** Soybeans
**Tillage:** No-till
**Herbicides:** ***Pre:*** Trivolt® + 2,4-D + atrazine
**Foliar Fungicides:** 8 oz/ac Delaro® Complete applied 7/15/24
**Fertilizer:** Variable, applied preplant

**Irrigation:** None
**Rainfall (in):**




**Introduction:** The Lower Platte South Natural Resources District (LPSNRD) and the City of Waverly have recently developed joint Drinking Water Protection Management and Wellhead Protection plans to address high nitrate concentrations detected in several of Waverly’s municipal wells. One focus of these efforts is public outreach and education on agricultural Best Management Practices (BMPs). This farmer was interested in evaluating lower nitrogen rates in dryland corn to understand how his N management could be adjusted to the BMP goals in the Waverly Wellhead Protection Area. The two treatments applied were the farmer’s rate of 150 lb N/ac and the reduced rate of 115 lb N/ac. The UNL N recommendation for this field, with a 185 bu/ac yield goal, was 77 lb N/ac. Nitrogen was broadcast on both treatments as 28% UAN preplant in early May.

**Results:**

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| 115 lb N/ac | 11.1 A* | 172 A | 689 A |
| 150 lb N/ac (Check) | 11.1 A | 174 A | 680 A |
| P-Value: | 0.99 | 0.92 | 0.89 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $57.50/ac 115 lb N/ac, $75/ac 150 lb N/ac.

**Summary:**

- There were no significant differences in moisture, yield or marginal net return between the treatments.
- For 2024 weather conditions at this site, results show that a reduction of 35 lb N/ac was possible without yield penalty.

# Pre-Plant vs Split-Applied Coulter vs Split-Applied Surface Nitrogen Application Study

**Study ID:** 0928155202402
**County:** Saunders
**Soil Type:** Yutan silty clay loam, Filbert silt loam, Tomek silt loam
**Planting Date:** 4/25/24
**Harvest Date:** 10/3/24
**Population:** 28,000
**Row Spacing (in):** 30
**Hybrid:** DEKALB® DKC63-91
**Reps:** 5
**Previous Crop:** Soybeans
**Tillage:** No-till
**Herbicides:** ***Pre:*** 3.19 oz/ac Laudis® + 8.5 oz/ac DiFlexx® + 23.4 oz/ac Roundup PowerMAX 3® on 5/8
***Post:*** 2.9 oz/ac Laudis® + 30.9 oz/ac Atrazine 4L + 21.2 oz/ac Roundup PowerMAX 3® on 5/30/24

**Seed Treatment:** Company standard
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Irrigation:** None
**Rainfall (in):**


**Introduction:** This study evaluated three application methods for applying nitrogen, with spring pre-plant applied anhydrous, split-applied nitrogen with a spring anhydrous base rate and sidedress coulter injected UAN, and split-applied nitrogen with a spring anhydrous base rate and sidedress surface-applied UAN. In addition, different N rates were evaluated with the pre-plant anhydrous receiving 0, 80, 120, 160, and 200 lbs per acre and the split applications receiving an 80 lbs base rate and 40, 80 or 120 lbs sidedress for a total of 120, 160, and 200 lbs N per acre.

Soil samples taken in March of 2024 showed residual soil nitrate values of 8.7 to 19.0 ppm for the 0-8 inch samples and 8.5 to 22.1 ppm for the 8-24 inch samples. These values are considerably higher than the default value of 3.6 ppm that the UNL calculator uses when no soil tests are available. Using these values in the UNL nitrogen calculator results in a nitrate nitrogen credit ranging from 45 to 97 lbs per acre. The UNL nitrogen calculator was used to determine an N rate with a yield goal of 230 bushels, which ranged from 72 to 124 lbs N per acre before adjustments for corn to nitrogen price ratio.

Sidedress applications were made with a Hagie high clearance machine, with the coulter plots using a nitrogen toolbar to inject the UAN, while UAN was sprayed on the soil surface of the remaining sidedress plots. Sidedress applications occurred on June 26 and the site received 5.52 inches of rain on July 2-3. The application width was 40 feet wide.

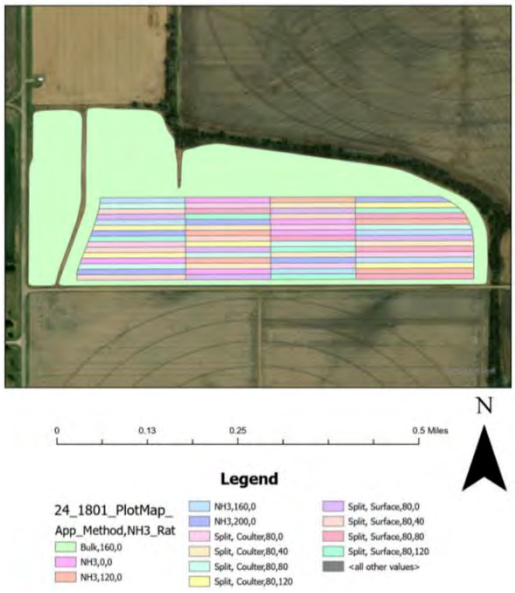



**Figure 1:** Treatment Design and Layout

**Baseline Soil Sample 0-8" (March 2024):**

| pH | OM LOI % | Nitrate–N ppm N (0-8") | Nitrate – N ppm N (8-24") | M-3 P ppm P | Sulfate-S ppm S | K ppm | Ca ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|
| 5.5 | 3.8 | 8.7 | 8.5 | 49 | 10.7 | 390 | 2178 | 19.7 |
| 7.0 | 3.8 | 19.0 | 22.1 | 34 | 12.3 | 372 | 2385 | 16.8 |

**Results:**

| Application Method (lb N as NH3_lb N as 32%UAN) | Yield (bu/ac)† | Moisture (%) | Total N (lb/ac) | Partial Factor Productivity of N (lb grain/lb N) | lb N/bu grain | Marginal Net Return ($/ac)‡ |
|---|---|---|---|---|---|---|
| NH3 0 lbs N | 209 B* | 12.7 A | 0 E | 0 E | 0 E | 910 AB |
| NH3 80 lbs N | 229 A | 12.5 A | 79.7 D | 160.9 A | 0.35 D | 985 A |
| NH3 120 lbs N | 230 A | 12.3 A | 120.6 C | 106.8 B | 0.53 C | 954 AB |
| NH3 160 lbs N | 225 AB | 12.3 A | 158.0 B | 79.6 C | 0.70 B | 917 AB |
| NH3 200 lbs N | 228 AB | 12.3 A | 194.2 A | 65.8 D | 0.85 A | 918 AB |
| Split, Coulter 80 lbs + 40 lbs N | 233 A | 12.4 A | 122.4 C | 106.5 B | 0.53 C | 961 AB |
| Split, Coulter 80 lbs + 80 lbs N | 226 AB | 12.3 A | 158.4 B | 80.1 C | 0.70 B | 915 AB |
| Split, Coulter 80 lbs + 120 lbs N | 229 A | 12.2 A | 196.8 A | 65.1 D | 0.86 A | 905 AB |
| Split, Surface 80 lbs + 40 lbs N | 231 A | 12.3 A | 121.4 C | 106.2 B | 0.53 C | 950 AB |
| Split, Surface 80 lbs + 80 lbs N | 234 A | 12.3 A | 158.9 B | 82.5 C | 0.68 B | 948 AB |
| Split, Surface 80 lbs + 120 lbs N | 227 AB | 11.9 A | 195.9 A | 65.0 D | 0.87 A | 900 B |
| P-Value: | 0.02 | 0.2 | <0.001 | <0.001 | <0.001 | 0.03 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $0.38 NH3, and $0.50 32% UAN.

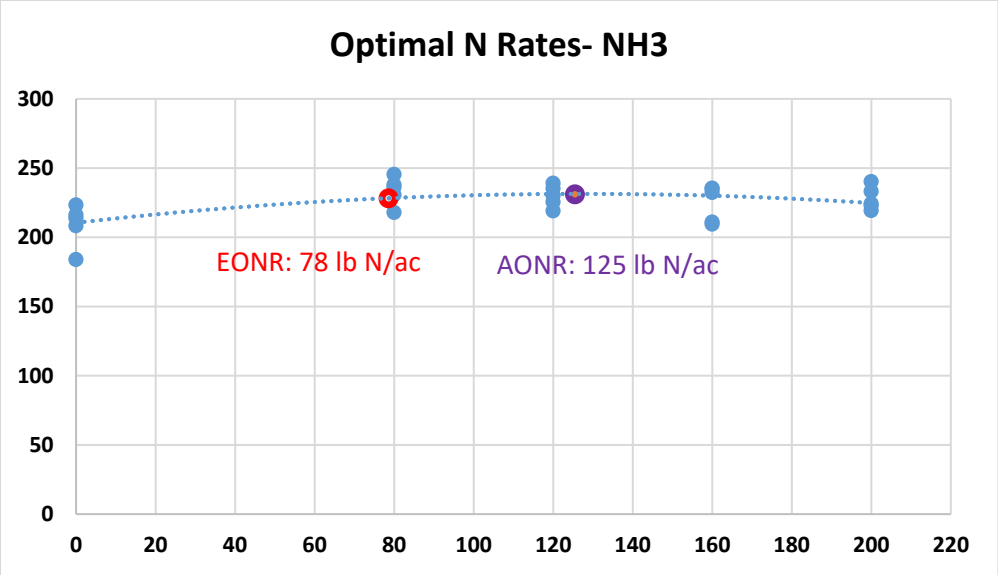



**Figure 2:** Optimal N Rates in NH3 treatments.

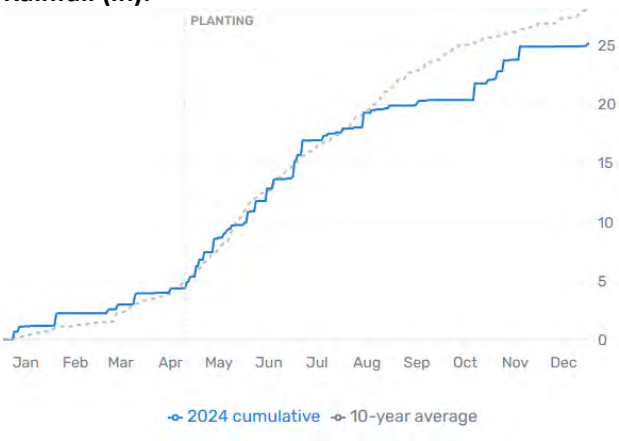
**Summary:**

- There were significant differences in yield, total N, partial factor productivity, and lbs N/bu of grain.
- There was a significant difference in marginal net return between NH3 80 lb N/ac ($986/ac) and split, surface 200 lb N/ac ($900/ac).
- In NH3 treatments, the EONR was 78 lb N/ac, and the AONR was 125 lb N/ac.
- 80 lbs of NH3 resulted in the lowest NUE (lb N/ bu grain) among N applications with a value of 0.35. The high residual nitrate levels likely contributed to the high yield for the check (209 bu/ac) and the lack of N response to higher rates.
- This study shows that soil sampling for residual soil nitrate can be a valuable tool and that high soil test nitrate values should be credited when determining N rates.

# Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

**Study ID:** 1243-035-2024-01
**County:** Clay
**Soil Type:** Crete silt loam, Uly-Hobbs silt loam, Hastings silt loam
**Planting Date:** 4/24/24
**Harvest Date:** 10/11/24
**Seeding Rate:** 34,000
**Row Spacing (in):** 30
**Hybrid:** Beck's® 6374V2P, Beck's® 6381AM
**Reps:** 4
**Previous Crop:** Soybeans
**Tillage:** No-Till
**Herbicides:** ***Pre:*** 16 oz/ac Atrazine® 4L + 12 oz/ac Detonate® + 3.5 oz/ac Fission® + 48 oz/ac Lexar® EZ + 21 oz/ac Roundup PowerMAX® 3 + 7.9 oz/ac Visca Flame® on 5/16/24
**Seed Treatment:** Beck's® Escalate®
**Foliar Insecticides:** None
**Foliar Fungicides:** 13.7 oz Trivapro® at VT

**Fertilizer:** 120 lb N/ac as 32-0-0 with Centuro® on 3/20/24
**Irrigation:** Pivot, Total: 5.62"
**Rainfall (in):**




**Baseline Soil Samples:**

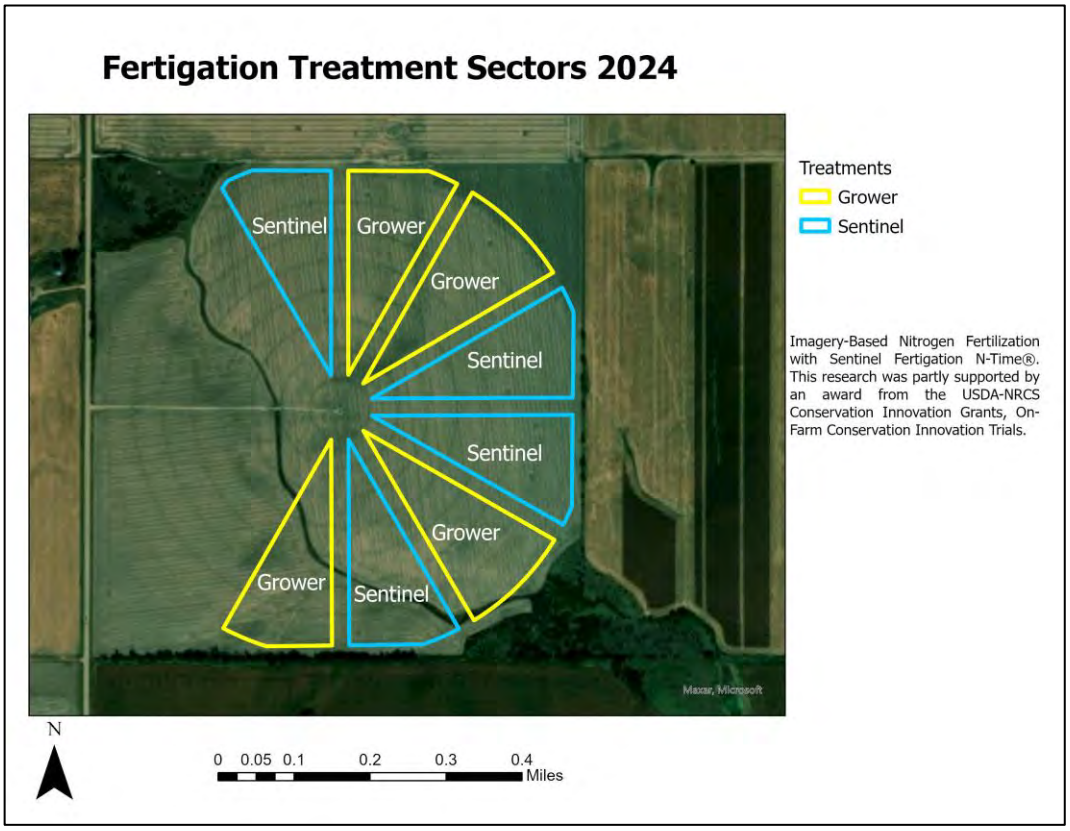
| pH | OM LOI % | Nitrate–N ppm N | P ppm | S ppm | K ppm | Ca ppm | Mg ppm | Na ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|---|
| 6.9 | 3.2 | 7.5 | 51 | 21.7 | 419 | 2327 | 249 | 67 | 15.1 |
| 7.2 | 2.6 | 6.4 | 64 | 14.0 | 414 | 3313 | 499 | 37 | 21.9 |
| 6.0 | 3.4 | 8.0 | 36 | 15.9 | 455 | 2550 | 506 | 29 | 19.8 |
| 5.7 | 3.1 | 12.4 | 78 | 27.6 | 429 | 1901 | 294 | 35 | 17.3 |

**Post Season Soil Samples:**

| pH | OM LOI % | Nitrate–N ppm N | P ppm | S ppm | K ppm | Ca ppm | Mg ppm | Na ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|---|
| 7.0 | 2.5 | 2.8 | 52 | 17.3 | 343 | 3711 | 633 | 48 | 24.9 |
| 6.4 | 3.3 | 4.1 | 24 | 15.3 | 285 | 2106 | 207 | 41 | 15.0 |
| 5.7 | 3.3 | 10.3 | 35 | 20.5 | 369 | 2103 | 333 | 39 | 19.4 |
| 5.3 | 3.1 | 5.6 | 38 | 20.0 | 308 | 1664 | 241 | 36 | 17.8 |
| 5.8 | 3.2 | 3.5 | 38 | 16.3 | 390 | 1783 | 240 | 43 | 16.8 |

**Introduction:** Corn nitrogen management may be improved by using sensors or imagery to detect and respond to corn N needs during the growing season. Sentinel Fertigation's N-Time® application analyzes multispectral images to deliver fertigation scheduling recommendations. Indicator blocks (small blocks established during the base N applications) with higher (+60 lb-N/ac) and lower (-30 lb-N/ac) nitrogen rates were applied in the field on March 20, 2024, to monitor and determine when fertigation was needed.

If an N application was recommended by N-Time®, the N (lb-N/ac) applied via fertigation (typically 30 or 60 lb-N/ac) is noted in the application table below. Note that different Sentinel sectors of the pivot may receive different recommendations throughout the growing season. This study compared the grower's standard N management to the Sentinel Fertigation N-Time® N management, with four paired sectors of each treatment (each sector was about 7.5 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown below.




**Application Table:** Nitrogen applied throughout the 2024 growing season is included in the table below. N applications (in lb-N/ac) are noted by date, along with products applied at those instances. Sentinel N-Time® began monitoring and directing N fertigation applications following the July 11, 2024, N application. N-Time® directed N applications are shaded in gray to the right of the double vertical lines in the table below.

N was applied using 32% UAN unless otherwise noted. Gray-shaded area to the right of the striped line indicates where Sentinel Fertigation N-Time® dictated N rates. The applied values were averaged across all reps; therefore, if only one out of four replications triggered an application of 30 lb N/ac, a value of 7.5 lb N/ac is reported as the average treatment N application across reps.

| | 3/20 | 7/11 | 7/25 | Total N Applied |
|---|---|---|---|---|
| **Treatment** | ----------*lb N/ac applied*---------- | | | |
| **Grower N Management** | 120 [a] | 35.4[b] | 35.4[b] | **190.8** |
| **Sentinel Fertigation N-Time®** | 120 [a] | - | 17.7 [b] | **137.7** |

[a] Product used was 32-0-0 UAN via Indicator block Rx

[b] Product used was 32-0-0 UAN via fertigation

| | Stand Counts | Stalk Rot (%) | Crude Protein Dry Basis | Ruminant Total Digestible Nutrients (TDN) (%) |
|---|---|---|---|---|
| Grower N Management | 32,750 A | 6.25 A | 8.23 A | 88.22 A |
| Sentinel Fertigation N-Time ® | 33,125 A | 6.88 A | 8.24 A | 88.04 A |
| P-Value | 0.547 | 0.638 | 0.979 | 0.616 |

**Results:**

| | Total N rate (lb/ac) | Moisture (%) | Yield (bu/ac)† | Partial Factor Productivity of N (lb grain/lb N) | lbs N/bu grain | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Grower N Management | 190.8 | 14.0 A* | 269 A | 79 B | 0.71 A | 1,074 A |
| Sentinel Fertigation N-Time® | 137.7 | 14.1 A | 264 A | 107 A | 0.52 B | 1,080 A |
| P-Value | N/A | 0.612 | 0.222 | 0.0005 | <0.0001 | 0.714 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre were corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn and $0.5 lb/N.

**Summary:**

- There were no significant differences for moisture, yield, or marginal net return between treatments.
- The Sentinel Fertigation N-Time® management system called for a 53.1 lb reduction in N applications during the growing season.
- There were significant differences in partial factor productivity and lbs N/bu of grain. Sentinel Fertigation N-Time® increased Partial Factor Productivity (PFP) by 28% and improved nitrogen use efficiency (NUE) by 26.76% compared to the grower N Management.
- Up to 20% greensnap was found in the field with the east-west rows having the most damage.

*This research was partly supported by an award from the USDA-NRCS Conservation Innovation Grants, On-Farm Conservation Innovation Trials, award number NR203A750013G014.*

# Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

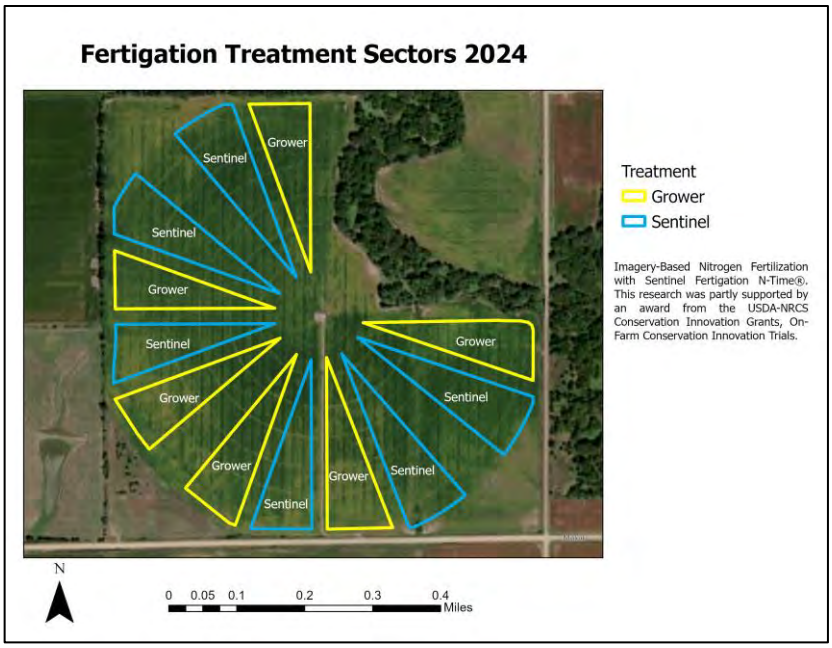
**Study ID:** 1348-187-2024-02
**County:** Seward
**Soil Type:** Hastings silt loam; Hall silt loam, Hord silt loam, Hobbs silt loam
**Planting Date:** 4/24/24
**Harvest Date:** 10/23/24
**Seeding Rate:** 31,800
**Row Spacing (in):** 30
**Hybrid:** Channel® 217-01STX
**Reps:** 6
**Previous Crop:** Corn
**Tillage:** Strip-till
**Herbicides:** ***Pre:*** 2 qt/ac Harness Xtra® 5.6 + 3.75 oz/ac Explorer® 3 + 30 oz/ac glyphosate on 4/26/24 ***Post:*** Liberty® + Explorer® + Fulltech® on 5/30/24
**Seed Treatment:** None
**Foliar Insecticides:** None
**Foliar Fungicides:** 13.7 oz/ac Trivapro®, 6.4 oz/ac Bifen® 2AG Gold on 7/16/24
**Fertilizer:** 150 lb/ac MESZ and 58 lb N/ac as urea on 4/4/24. 17 lb N/ac on 4/26/24
**Irrigation:** Pivot, Total: 6.2"
**Rainfall (in):**


**Post Season Average Soil Samples 0-8" (November 2024):**

| | pH | OM LOI % | Nitrate–N ppm N | M3–P ppm P | Sulfate–S ppm S | K ppm | Ca ppm | Mg ppm | Na ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|---|---|
| Sentinel | 7.1 | 3.4 | 11.2 | 19 | 6.8 | 234 | 1570 | 186 | 22 | 10.1 |
| Grower | 7.0 | 3.4 | 14 | 36 | 8.3 | 278 | 1812 | 226 | 25 | 11.7 |

**Introduction:** Corn nitrogen management may be improved by using sensors or imagery to detect and respond to corn N needs during the growing season. Sentinel Fertigation's N-Time® application analyzes multispectral images to deliver fertigation scheduling recommendations. Indicator blocks (small blocks established during the base N applications) with higher (+60 lb-N/ac) and lower (-30 lb-N/ac) nitrogen rates were applied in the field on June 10, 2024, to monitor and determine when fertigation was needed.

If an N application was recommended by N-Time®, the N (lb-N/ac) applied via fertigation (typically 30 or 60 lb-N/ac) is noted in the application table below. Note that different Sentinel sectors of the pivot may receive different recommendations throughout the growing season. This study compared the grower's standard N management to the Sentinel Fertigation N-Time® N management, with six paired sectors of each treatment (each sector was about 7 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown below.




**Application Table:** Nitrogen applied throughout the 2024 growing season is included in the table below. N applications (in lb-N/ac) are noted by date, along with products applied at those instances. Sentinel N-Time® began monitoring and directing N fertigation applications following the April 4, 2024, N application. N-Time® directed N applications are shaded in gray to the right of the double vertical lines in the table below.

N was applied using 32% UAN unless otherwise noted. Gray-shaded area to the right of the striped line indicates where Sentinel Fertigation N-Time® dictated N rates. The applied values were averaged across all reps; therefore, if only one out of six replications triggered an application of 30 lb N/ac, a value of 5 lb N/ac is reported as the average treatment N application across reps.

| | 4/4 | | 6/10 | 6/20 | 7/15 | 8/2 | Total N Applied |
|---|---|---|---|---|---|---|---|
| **Treatment** | | | | | | | |
| **Grower N Management** | 89.9 [a] | 15 | 66[b] | - | 40 [c] | 26 [c] | **236.9** |
| **Sentinel Fertigation N-Time®** | 91.3 [a] | 15 | 61.06[b] | 21.66b | 10c | 6.7c | **205.7** |

[a] Product used was Urea/MESZ blend via strip-till

[b] Product used was 32-0-0 UAN via slice establishment

[c] Product used was 90% 32-0-0 UAN/10% ATS

**Results:**

| | Total N rate (lb/ac) | Moisture (%) | Yield (bu/ac)† | Partial Factor Productivity of N (lb grain/lb N) | lbs N/bu grain | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Grower N Management | 219.7 | 12.0 A* | 247.9 A | 62.3 A | 0.886 A | 969 A |
| Sentinel Fertigation N-Time® | 205.7 | 11.9 A | 254.9 A | 69.4 A | 0.807 A | 1006 A |
| P-Value | N/A | 0.792 | 0.546 | 0.0986 | 0.109 | 0.421 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre were corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn and $0.5 lb/N.

| | Stand Counts | Stalk Rot (%) | Crude Protein Dry Basis | Ruminant Total Digestible Nutrients (TDN) (%) |
|---|---|---|---|---|
| Grower N Management | 30,750 A | 14.58 A | 7.44 A | 89.39 A |
| Sentinel Fertigation N-Time ® | 30,583 A | 13.33 A | 7.85 A | 89.36 A |
| P-Value | 0.862 | 0.85 | 0.314 | 0.866 |

**Summary:**

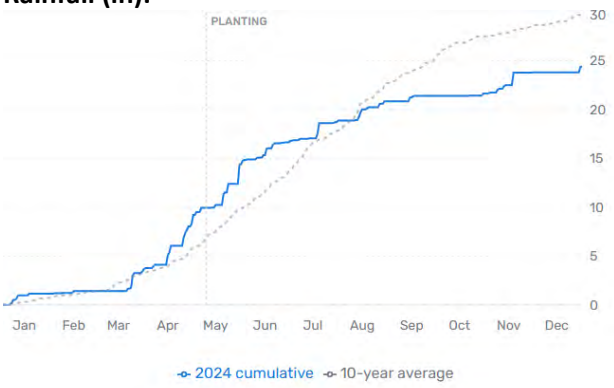
- There were no significant differences for moisture, yield, partial factor productivity, lbs N/bu grain, or marginal net return between the treatments.
- The Sentinel Fertigation N-Time® management system called for 14 lb N/ac additional N applications during the growing season, which resulted in no difference in yield.
- The June 10 application for indicator block establishment applied more than targeted due to a calibration error with the pump.
- The grower had planned on applying a second application of N for all of his sectors in August, but ran out of fertilizer before all sectors recieved applications.

*This research was partly supported by an award from the USDA-NRCS Conservation Innovation Grants, On-Farm Conservation Innovation Trials, award number NR203A750013G014.*

# Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

**Study ID:** 0437-107-2024-01
**County:** Knox
**Soil Type: G**ibbon silt loam
**Planting Date:** 5/9/24
**Harvest Date:** 10/29/24
**Seeding Rate:** 33,000
**Row Spacing (in):** 30
**Hybrid:** DEKALB® DKC59-82
**Reps:** 2
**Previous Crop:** Soybeans
**Tillage:** Strip-Till
**Herbicides:** ***Pre:*** 24 oz/ac Roundup® + 8 oz/ac dicamba + 2 qt/ac Fearless Xtra® on 5/13 ***Post:*** 24 oz/ac Roundup® + 3 oz/ac Status® + 4 oz/ac Callisto® + 8 oz/ac atrazine on 5/30/24
**Seed Treatment:** None
**Foliar Insecticides:** None
**Foliar Fungicides:** 13.7 oz/ac Trivapro®

**Fertilizer:** 142 lb/ac 11-52-0 on 4/23, 15 gal/ac 3-20-0-6.8-0.5 liquid starter on 5/9, 200 lb 40-0-0-6 on 6/11/24
**Irrigation:** Pivot, Total: 13"
**Rainfall (in):**

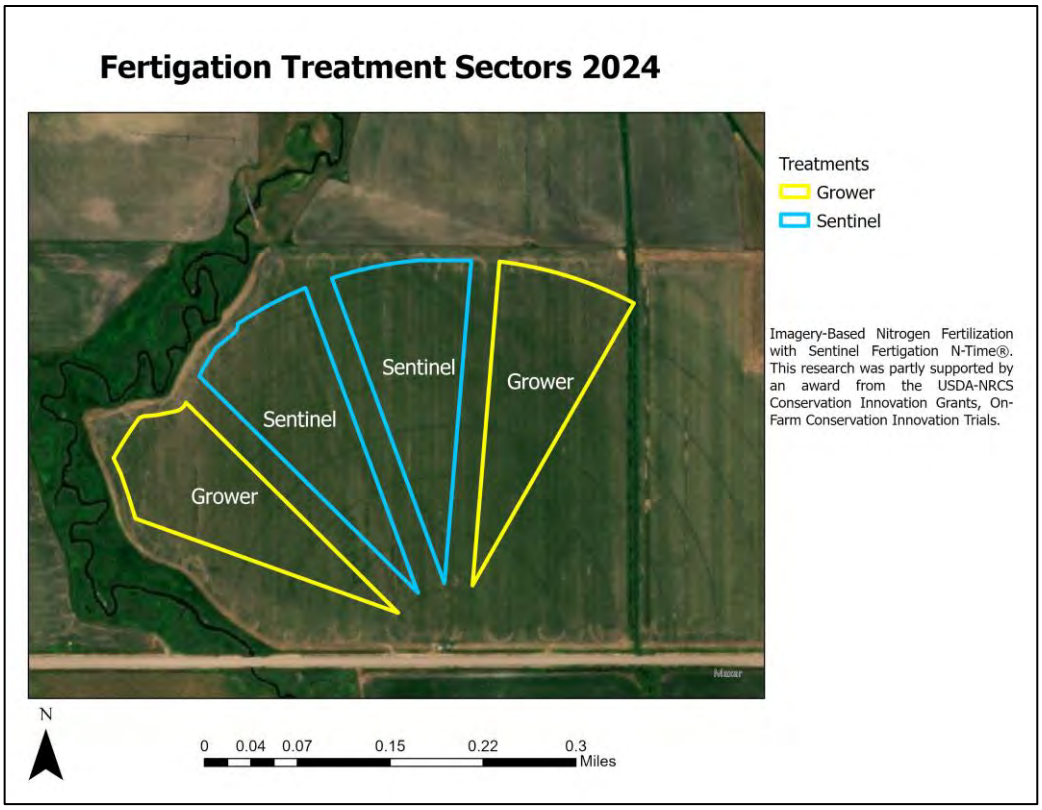



**Average Baseline Soil Samples 0-8" (March 2024):**

| pH | OM LOI % | Nitrate–N ppm N (0-36") | Sulfate–S ppm S | K ppm | Ca ppm | Mg ppm | Na ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|
| 7.2 | 3.6 | 4.0 | 3.4 | 163.8 | 2451.7 | 142.6 | 20.3 | 15.0 |

**Introduction:** Corn nitrogen management may be improved by using sensors or imagery to detect and respond to corn N needs during the growing season. Sentinel Fertigation's N-Time® application analyzes multispectral images to deliver fertigation scheduling recommendations. Indicator blocks (small blocks established during the base N applications) with higher (+60 lb-N/ac) and lower (-30 lb-N/ac) nitrogen rates were applied in the field on June 12, 2024, to monitor and determine when fertigation was needed.

If an N application was recommended by N-Time®, the N (lb-N/ac) applied via fertigation (typically 30 or 60 lb-N/ac) is noted in the application table below. Note that different Sentinel sectors of the pivot may receive different recommendations throughout the growing season. This study compared the grower's standard N management to the Sentinel Fertigation N-Time® N management, with two paired sectors of each treatment (each sector was about 5 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown below




**Application Table:** Nitrogen applied throughout the 2024 growing season is included in the table below. N applications (in lb-N/ac) are noted by date, along with products applied at those instances. Sentinel N-Time® began monitoring and directing N fertigation applications following the July 5, 2024, N application. N-Time® directed N applications are shaded in gray to the right of the double vertical lines in the table below.

N was applied using 32% UAN unless otherwise noted. Gray-haded area to the right of the striped line indicates where Sentinel Fertigation N-Time® dictated N rates. The applied values were averaged across all reps; therefore, if only one out of two replications triggered an application of 30 lb N/ac, a value of 15 lb N/ac is reported as the average treatment N application across reps.

| | 6/12 | 7/5 | Total N Applied |
|---|---|---|---|
| **Treatment** | *lb N/ac applied* | | |
| **Grower N Management** | 82.95[a] | - | **82.95** |
| **Sentinel Fertigation N-Time®** | 76.65[a] | 21.85[b] | **98.5** |

[a] Product used was 40-0-0-6 UAN via indicator block Rx

[b] Product used was 28-0-5 UAN via fertigation

**Results:**

| | Total N rate (lb/ac) | Moisture (%) | Yield (bu/ac)† | Partial Factor Productivity of N (lb grain/lb N) | lbs N/bu grain | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Grower N Management | 83.0 | 12.2 | 264.5 | 178.6 | 0.314 | 1,109 |
| Sentinel Fertigation N-Time® | 98.5 | 11.8 | 265.6 | 151.0 | 0.371 | 1,106 |

†Yield values are from cleaned yield monitor data. Bushels per acre were corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn and $0.5 lb/N.

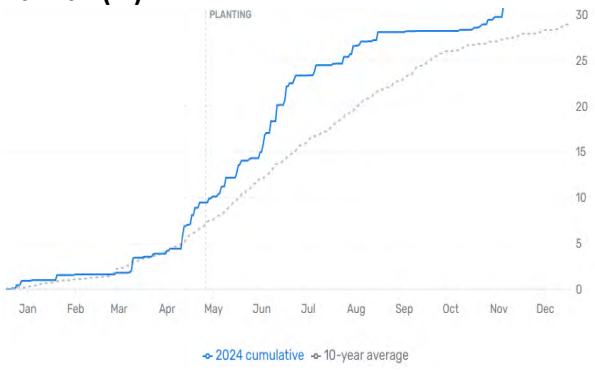
**Summary:**

- Because there were only two replications, no statistics could be run on this study. Therefore no conclusions can be made from the data.
- The Sentinel Fertigation N-Time® management system called for 15.3 lb/ac additional N applications during the growing season.

*This research was partly supported by an award from the USDA-NRCS Conservation Innovation Grants, On-Farm Conservation Innovation Trials, award number NR203A750013G014.*

# Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

**Study ID:** 1541-011-2024-02
**County:** Nance
**Soil Type:** Nora silt loam, Nora-Crofton complex, Belfore silty clay loam
**Planting Date:** 5/18/24
**Harvest Date:** 10/22/24
**Seeding Rate:** 32,000-36,000
**Row Spacing (in):** 30
**Reps:** 6
**Previous Crop:** Soybeans
**Tillage:** No-Till
**Herbicides:** ***Pre:*** 16 oz/ac Aatrex® 4L + 40 oz/ac Resicore® + 32 oz/ac Glyplex®+ 12 oz/ac 2-4D + LV6 on 5/9 ***Post:*** 16 oz/ac Aatrex® 4L + 40 oz/ac Resicore® + 32 oz/ac Glyplex® on 6/7/24
**Seed Treatment:** Pivot Bio Proven® 40 OS, ipconazole, ethaboxam, L-2012R, Lumivia®, Lumisure®, Lumialza®
**Foliar Insecticides:** 1.6 oz/ac Bifenture® 2EC on 5/29, 6.8 oz/ac Bifenture® on 8/10/24
**Foliar Fungicides:** 8 oz/ac Xyway® on 5/18 , 6 oz/ac Aproach® Prima on 8/10/24
**Fertilizer:** Pell lime, 11-52-0, 0-0-60 , 5 oz/ac Utrisha® N on 6/25/24
**Irrigation:** Pivot, Total: 7.5"
**Rainfall (in):**

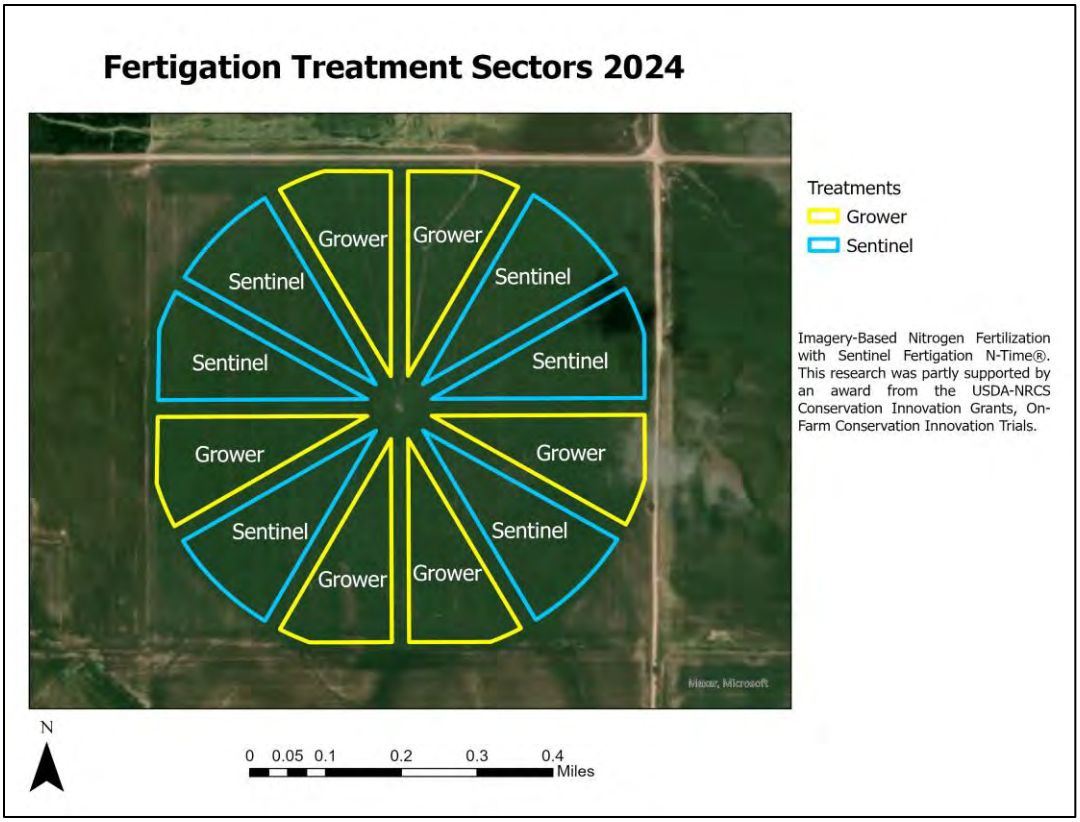



**Soil Samples (November 2024):**

| pH | OM LOI % | M3–P ppm P | Sulfur ppm S | K ppm | Ca ppm | Mg ppm | Na ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|
| 6.0 | 3.9 | 83 | 10 | 276 | 2565 | 381 | 6 | 19.6 |
| 5.6 | 3.2 | 259 | 12 | 254 | 2066 | 259 | 13 | 17.3 |
| 6.8 | 3.5 | 39 | 14 | 297 | 3011 | 395 | 14 | 19.8 |
| 6.3 | 3.4 | 59 | 12 | 314 | 2821 | 485 | 21 | 21.2 |
| 7.0 | 2.6 | 73 | 14 | 343 | 2545 | 339 | 14 | 16.6 |
| 6.7 | 3.0 | 37 | 9 | 254 | 2607 | 414 | 15 | 18.0 |

**Introduction:** Corn nitrogen management may be improved by using sensors or imagery to detect and respond to corn N needs during the growing season. Sentinel Fertigation's N-Time® application analyzes multispectral images to deliver fertigation scheduling recommendations. Indicator blocks (small blocks established during the base N applications) with higher (+60 lb-N/ac) and lower (-30 lb-N/ac) nitrogen rates were applied in the field on June 13, 2024, to monitor and determine when fertigation was needed.

If an N application was recommended by N-Time®, the N (lb-N/ac) applied via fertigation (typically 30 or 60 lb-N/ac) is noted in the application table below. Note that different Sentinel sectors of the pivot may receive different recommendations throughout the growing season. This study compared the grower's standard N management to the Sentinel Fertigation N-Time® N management, with six paired sectors of each treatment (each sector was about 7.5 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown below.




**Application Table:** Nitrogen applied throughout the 2024 growing season is included in the table below. N applications (in lb-N/ac) are noted by date, along with products applied at those instances. Sentinel N-Time® began monitoring and directing N fertigation applications following the June 13, 2024, N application. N-Time® directed N applications are shaded in gray to the right of the double vertical lines in the table below.

N was applied using 32% UAN unless otherwise noted. Gray-shaded area to the right of the striped line indicates where Sentinel Fertigation N-Time® dictated N rates. The applied values were averaged across all reps; therefore, if only one out of six replications triggered an application of 30 lb N/ac, a value of 5 lb N/ac is reported as the average treatment N application across reps. *Note: late season southern rust impacted yield 10-15%.*

| | | 6/13 | | 7/5 | 7/23 | 8/12 | Total N Applied |
|---|---|---|---|---|---|---|---|
| **Treatment** | | | | | | | |
| **Grower N Management** | 21.2[a] | 38.4[b] | 34[c] | 17.1[b] | 34[c] | 11.4[c] | **156.1** |
| **Sentinel Fertigation N-Time®** | 21.1[a] | 38.5[b] | 34[c] | 27.5[b] | - | 19[c] | **140.1** |

[a] Product used was MAP
[b] Product used was 95% 32-0-0 + 5% ATS via Indicator block establishment
[c] Product used was applied with post-emerge herbicide
[d] Product used was 95% 32-0-0 + 5% ATS via fertigation

**Results:**

| | Total N rate (lb/ac) | Moisture (%) | Yield (bu/ac)† | Partial Factor Productivity of N (lb grain/lb N) | lbs N/bu grain | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Grower N Management | 156.1 | 16.4 A* | 224 A | 80.3 A | 0.697 A | 896 A |
| Sentinel Fertigation N-Time® | 140.1 | 16.4 A | 228 A | 91.0 A | 0.615 A | 920 A |
| P-Value | N/A | 0.917 | 0.423 | 0.0878 | 0.107 | 0.141 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre were corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn and $0.5 lb/N.

**Summary:**

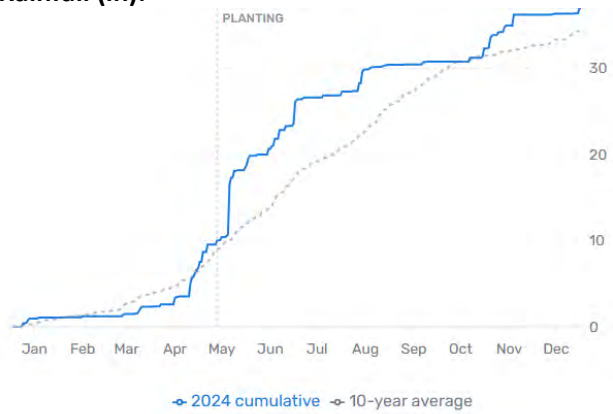
- There were no significant differences in moisture, yield, partial factor productivity, lbs N/bu grain, or marginal net return between treatments.
- The Sentinel Fertigation N-Time® management system called for 16 lb N/ac reduction in N applications during the growing season.
- Late season Southern Rust impacted the yield for the entire field by 10-15%.

*This research was partly supported by an award from the USDA-NRCS Conservation Innovation Grants, On-Farm Conservation Innovation Trials, award number NR203A750013G014.*

# Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

**Study ID:** 1547-155-2024-01
**County:** Saunders
**Soil Type:** Yutan silty clay loam, Tomek silt loam, Pohocco-Pahuk complex
**Planting Date:** 5/12/24
**Harvest Date:** 10/21/24
**Seeding Rate:** 33,000
**Row Spacing (in):** 30
**Hybrid:** Pioneer® P1742Q, DEKALB® DKC70-27RIB, Channel® C217-01STXRIB
**Reps:** 3
**Previous Crop:** Corn
**Tillage:** Strip-Till
**Herbicides:** ***Pre:*** 3 oz/ac Balance® Flexx + 57.6 oz/ac Harness® Xtra + 6 oz/ac generic dicamba, 36 oz/ac Roundup PowerMAX®, and crop oil ***Post:*** 10 oz/ac DiFlexx®, 8 oz/ac atrazine, 2.5 oz/ac Anthem® Maxx, 3.5 oz/ac Callisto®, and 36 oz/ac Roundup PowerMAX®

**Seed Treatment:** My Yield® PRYME CRN
**Foliar Insecticides:** 6.6 oz/ac bifenthrin on 7/18
**Foliar Fungicides:** 8 oz/ac Adastrio® on 7/18
**Irrigation:** Pivot
**Rainfall (in):**

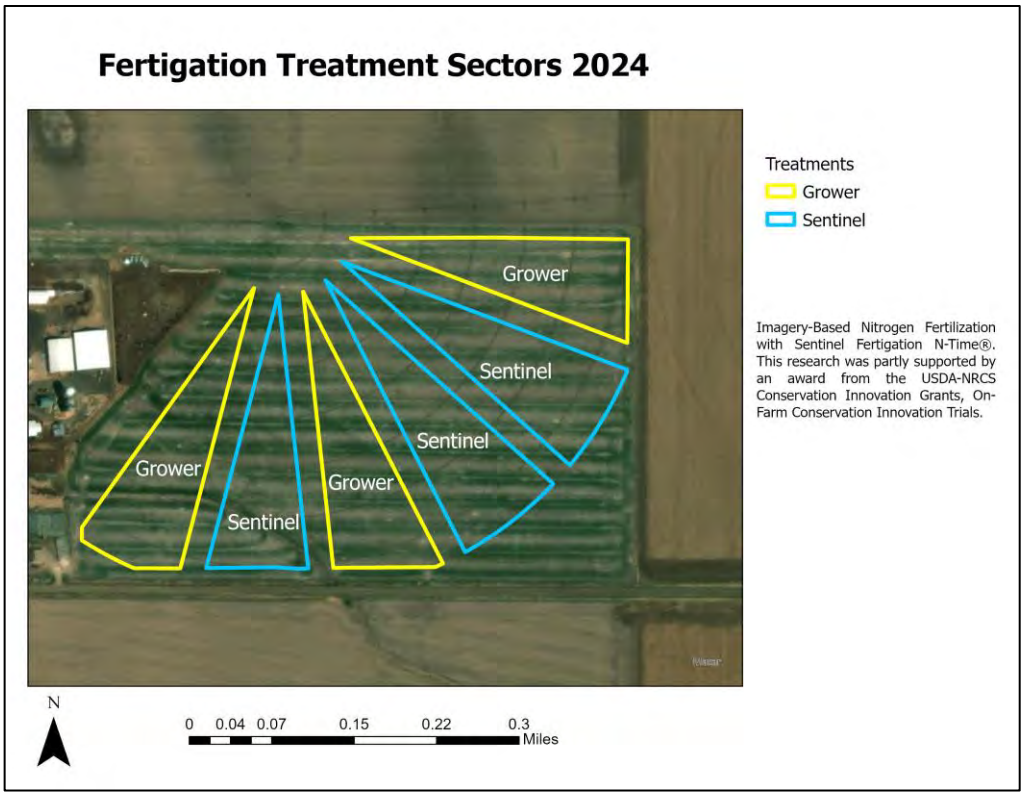



**Post Season Average Soil Samples 0-8" (November 2024):**

| | pH | OM LOI % | Nitrate–N ppm N | M3–P ppm P | Sulfate–S ppm S | K ppm | Ca ppm | Mg ppm | Na ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|---|---|
| Sentinel | 7.2 | 3.8 | 13.0 | 35 | 14.3 | 397 | 2304 | 310 | 20 | 15.2 |
| Grower | 7.4 | 4.1 | 19.7 | 60 | 15.0 | 425 | 2395 | 326 | 22 | 15.9 |

**Introduction:** Corn nitrogen management may be improved by using sensors or imagery to detect and respond to corn N needs during the growing season. Sentinel Fertigation's N-Time® application analyzes multispectral images to deliver fertigation scheduling recommendations. Indicator blocks (small blocks established during the base N applications) with higher (+60 lb-N/ac) and lower (-30 lb-N/ac) nitrogen rates were applied in the field on June 6, 2024, to monitor and determine when fertigation was needed.

If an N application was recommended by N-Time®, the N (lb-N/ac) applied via fertigation (typically 30 or 60 lb-N/ac) is noted in the application table below. Note that different Sentinel sectors of the pivot may receive different recommendations throughout the growing season. This study compared the grower's standard N management to the Sentinel Fertigation N-Time® N management, with three paired sectors of each treatment (each sector was about 4.5 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown below.




**Application Table:** Nitrogen applied throughout the 2024 growing season is included in the table below. N applications (in lb-N/ac) are noted by date, along with products applied at those instances. Sentinel N-Time® began monitoring and directing N fertigation applications following the June 24, 2024, N application. N-Time® directed N applications are shaded in gray to the right of the double vertical lines in the table below.

N was applied using 32% UAN unless otherwise noted. Gray shaded area to the right of the striped line indicates where Sentinel Fertigation N-Time® dictated N rates. The applied values were averaged across all reps; therefore, if only one out of three replications triggered an application of 30 lb N/ac, a value of 10 lb N/ac is reported as the average treatment N application across reps.

| | 6/6 | 6/24 | 7/5 | Total N Applied |
|---|---|---|---|---|
| **Treatment** | ----------*lb N/ac applied*---------- | | | |
| **Grower N Management** | 51.8 [a] | 30[b] | 30[b] | **111.8** |
| **Sentinel Fertigation N-Time®** | 51.8 [a] | 20[b] | 20[b] | **91.8** |

[a] Product used was 80% 32-0-0 + 20% ATS + Water + Boron + Molasses via indicator block Rx

[b] Product used was NitroMag®+32-0-0 UAN via fertigation

**Results:**

| | Total N rate (lb/ac) | Moisture (%) | Yield (bu/ac)† | Partial Factor Productivity of N (lb grain/lb N) | lbs N/bu grain | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Grower N Management | 111.8 | 16.4 A* | 262 A | 131.1 A | 0.43 A | 1,083 A |
| Sentinel Fertigation N-Time® | 91.8 | 16.5 A | 258 A | 157.5 A | 0.35 A | 1,078 A |
| P-Value | N/A | 0.706 | 0.794 | 0.372 | 0.652 | 0.938 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre were corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn and $0.5 lb/N.

**Summary:**

- There were no significant differences for moisture, yield, partial factor productivity, lbs N/bu grain, or marginal net return between treatments.
- The Sentinel Fertigation N-Time® management system called for a 20 lb N/ac reduction in N applications during the growing season.
- Note the very low NUE values for both the grower management and Sentinel Fertigation N-Time® management in this study.

*This research was partly supported by an award from the USDA-NRCS Conservation Innovation Grants, On-Farm Conservation Innovation Trials, award number NR203A750013G014.*

# Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

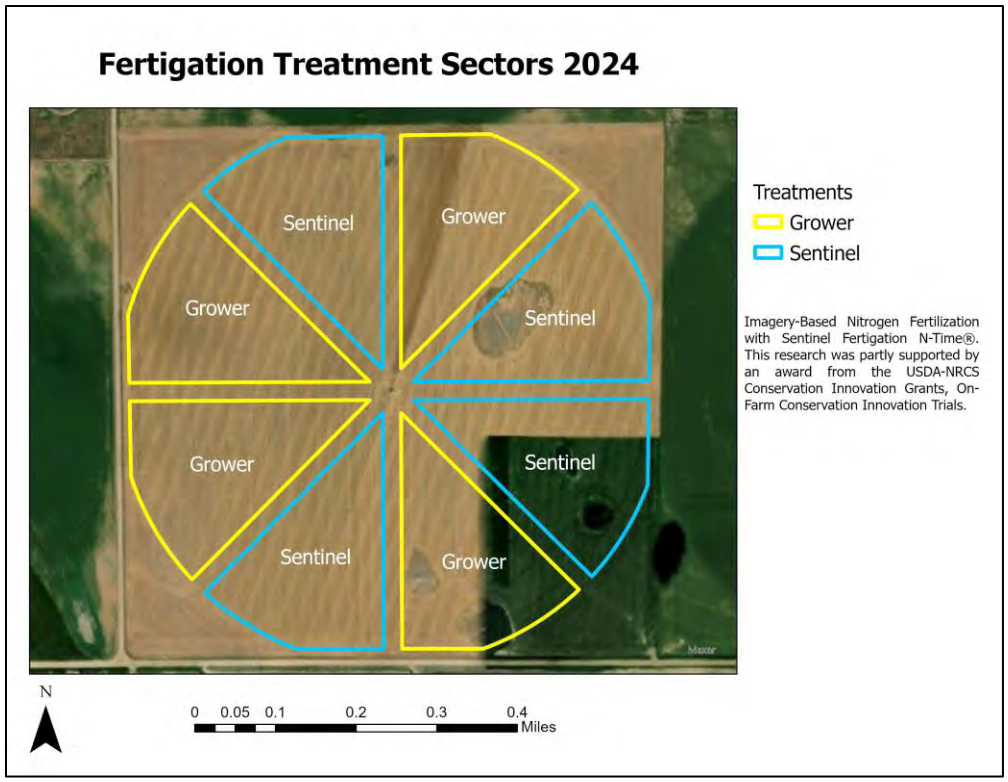
**Study ID:** 0130-113-2024-01
**County:** Logan
**Soil Type:** Hord silt loam, Holdrege-Hord silt loam
**Planting Date:** 5/11/24
**Harvest Date:** 10/15/24
**Seeding Rate:** 30,000
**Row Spacing (in):** 30
**Hybrid:** Hoegemeyer® 7434
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** Strip-till
**Herbicides:** ***Pre:*** 24 oz/ac glyphosate + 16 oz/ac Armezon® PRO + 0.5 oz Armezon® + 32 oz/ac Atra 4L ***Post:*** 64 oz/ac Fulltime® + 6 oz/ac Clash®
**Seed Treatment:** Standard seed treatment
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Irrigation:** Pivot, Total: 7"
**Rainfall (in):**


**Post Season Average Soil Samples 0-8" (November 2024):**

| | pH | OM LOI % | Nitrate–N ppm N | M3–P ppm P | Sulfate–S ppm S | K ppm | Ca ppm | Mg ppm | Na ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|---|---|
| Sentinel | 6.6 | 2.5 | 5 | 26.5 | 14.6 | 285 | 1338 | 144 | 16 | 10.2 |
| Grower | 6.3 | 2.4 | 6 | 24.5 | 10.2 | 231 | 1024 | 108 | 14 | 9.2 |

**Introduction:** Corn nitrogen management may be improved by using sensors or imagery to detect and respond to corn N needs during the growing season. Sentinel Fertigation's N-Time® application analyzes multispectral images to deliver fertigation scheduling recommendations. Indicator blocks (small blocks established during the base N applications) with higher (+60 lb-N/ac) and lower (-30 lb-N/ac) nitrogen rates were applied in the field on June 8, 2024, to monitor and determine when fertigation was needed.

If an N application was recommended by N-Time®, the N (lb-N/ac) applied via fertigation (typically 30 or 60 lb-N/ac) is noted in the application table below. Note that different Sentinel sectors of the pivot may receive different recommendations throughout the growing season. This study compared the grower's standard N management to the Sentinel Fertigation N-Time® N management, with four paired sectors of each treatment (each sector was about 16 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown below.




**Application Table:** Nitrogen applied throughout the 2024 growing season is included in the table below. N applications (in lb-N/ac) are noted by date, along with products applied at those instances. Sentinel N-Time® began monitoring and directing N fertigation applications following the June 8, 2024, N application. N-Time® directed N applications are shaded in gray to the right of the double vertical lines in the table below.

N was applied using 32% UAN unless otherwise noted. Gray-shaded area to the right of the striped line indicates where Sentinel Fertigation N-Time® dictated N rates. The applied values were averaged across all reps; therefore, if only one out of four replications triggered an application of 30 lb N/ac, a value of 7.5 lb N/ac is reported as the average treatment N application across reps.

| | 6/8 | 7/2 | 7/12 | Total N Applied |
|---|---|---|---|---|
| **Treatment** | ----------*lb N/ac applied*---------- | | | |
| **Grower N Management** | 39.04[a] | 60.78[b] | - | **99.8** |
| **Sentinel Fertigation N-Time®** | 38.9 [a] | 39.03[b] | 45[c] | **122.9** |

[a] Product used was 40% Urea / 60% AMS via dry spread for indicator block Rx

[b] Product used was 90% 32-0-0/10% ATS + Moly via side dress

[c] Product used was 81% 32-0-0/9% ATS/9% Moly via fertigation

**Results:**

| | Total N rate (lb/ac) | Moisture (%) | Yield (bu/ac)† | Partial Factor Productivity of N (lb grain/lb N) | lbs N/bu grain | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Grower N Management | 99.8 | 15.5 A* | 209.3 B | 117.4 A | 0.477 B | 860 B |
| Sentinel Fertigation N-Time® | 122.9 | 16.0 A | 227.5 A | 103.6 A | 0.540 A | 923¥ A |
| P-Value | N/A | 0.363 | 0.00887 | 0.0285 | 0.0329 | 0.0129 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre were corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn and $0.50 lb/N.
¥MNR average for Sentinel sectors was reduced by $5/ac to account for additional pivot pass requested for this application.

**Summary:**

- There were no significant differences for moisture or partial factor productivity.
- There were significant differences for yield, lbs N/bu grain, and marginal net return.
- The Sentinel Fertigation N-Time® management system called for 23.1 lb N/ac more compared to the grower N management, resulting in a yield increase of 18.2 bu/ac.
- Sentinel Fertigation N-Time® increased N use efficiency by 11.7%.
- There was a significant difference in marginal net return, with Sentinel Fertigation N-Time® yielding an additional $63/ac.

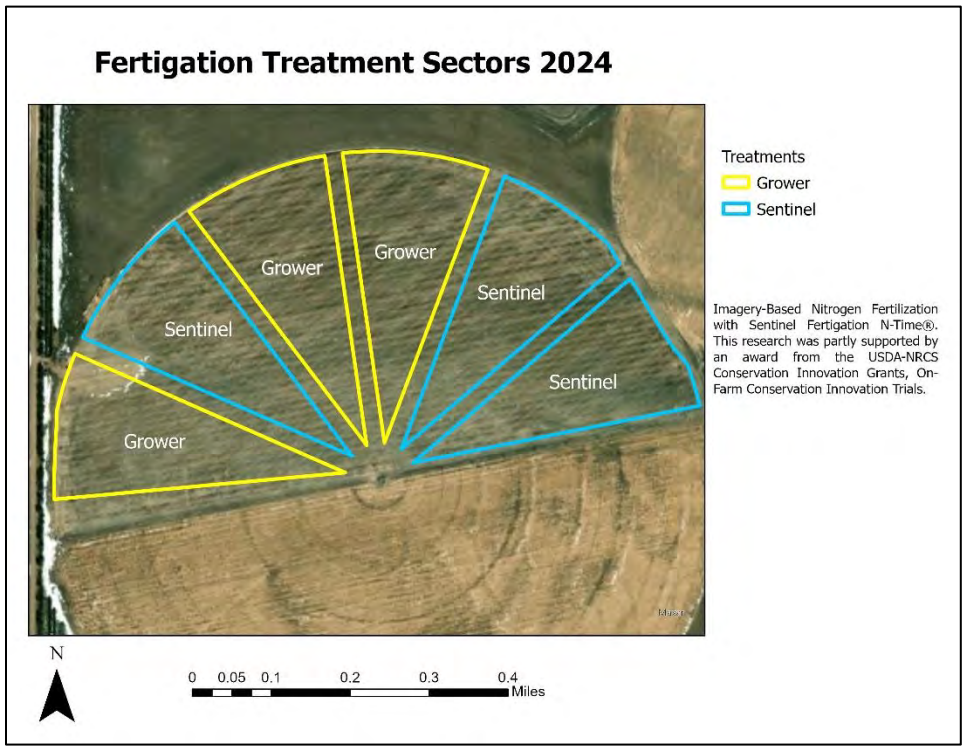
*This research was partly supported by an award from the USDA-NRCS Conservation Innovation Grants, On-Farm Conservation Innovation Trials, award number NR203A750013G014.*

# Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

**Study ID:** 1555105202401
**County:** Kimball
**Soil Type:** Sandy loam
**Planting Date:** 4/30/24
**Harvest Date:** 10/11/24
**Seeding Rate:** 32,600
**Row Spacing (in):** 30”
**Hybrid:** Channel® 192-10STX, 186-02STX, Beck’s® 4362SX
**Reps:** 3
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 24 oz/ac RT3® + 4 oz mesotrione + 3 oz FBN Even® L ***Post:*** 8 oz/ac DiFlexx® + 2 oz/ac FBN Even® L + 64 oz/ac Statera® Green Acre + 8 oz/ac boron + 8 oz/ac React® Mn + 28 oz/ac glyphosate applied 6/17/24
**Seed Treatment:** 80/20 graphite

**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** 1 oz/ac molasses, 160 oz/ac Hydra-hume, and 3.5 gal/ac in furrow compost tea on 4/30/24
**Irrigation:** Pivot, 9”
**Rainfall (in):**


**Introduction:** Corn nitrogen management may be improved by using sensors or imagery to detect and respond to corn N needs during the growing season. Sentinel Fertigation's N-Time® application analyzes multispectral images to deliver fertigation scheduling recommendations. Indicator blocks (small blocks established during the base N applications) with higher (+60 lb-N/ac) and lower (-30 lb-N/ac) nitrogen rates were applied in the field on May 7, 2024, to monitor and determine when fertigation was needed.




If an N application was recommended by N-Time®, the N (lb-N/ac) applied via fertigation (typically 30 or 60 lb-N/ac) is noted in the application table below. Note that different Sentinel sectors of the pivot may receive different recommendations throughout the growing season. This study compared the grower's standard N

management to the Sentinel Fertigation N-Time® N management, with three paired sectors of each treatment (each sector was about 12 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown above.

**Application Table:** Nitrogen applied throughout the 2024 growing season is included in the table below. N applications (in lb-N/ac) are noted by date, along with products applied at those instances. Sentinel N-Time® began monitoring and directing N fertigation applications following the July 12, 2024, N application, N-Time® directed N applications are shaded in gray to the right of the double vertical lines in the table below.

N was applied using 32% UAN unless otherwise noted. Gray-shaded area to the right of the striped line indicates where Sentinel Fertigation N-Time® dictated N rates. The applied values were averaged across all reps; therefore, if only one out of three replications triggered an application of 30 lb N/ac, a value of 10 lb N/ac is reported as the average treatment N application across reps.

| | 5/7 | 7/12 | 7/18 | 7/29 | 8/19 | Total N Applied |
|---|---|---|---|---|---|---|
| **Treatment** | ----------*lb N/ac applied*---------- | | | | | |
| **Grower N Management** | 45.2[a] | 50[b] | 30[b] | 25[b] | - | **150.2** |
| **Sentinel Fertigation N-Time®** | 45.2 [a] | 60[b] | 44[b] | 13.3[b] | 20[b] | **182.5** |

[a] Product used was 27-0-0-5+Mol+Hume via indicator block establishment application

[b] Product used was 28-0-0-5 via fertigation

**Results:**

| | Total N rate (lb/ac) | Moisture (%) | Yield (bu/ac)† | Partial Factor Productivity of N (lb grain/lb N) | lbs N/bu grain | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Grower N Management | 150.2 | 13.0 A* | 144.4 A | 53.8 B | 1.04 A | 553 A |
| Sentinel Fertigation N-Time® | 183 | 13.5 A | 149.1 A | 45.7 A | 1.23 B | 557 A |
| P-Value | N/A | 0.312 | 0.344 | 0.01 | 0.01 | 0.842 |

*Values with the same letter are not significantly different at a 90% confidence level.

†Yield values are from cleaned yield monitor data. Bushels per acre were corrected to 15.5% moisture.

‡Marginal net return based on $4.35/bu corn and $0.50 lb/N.

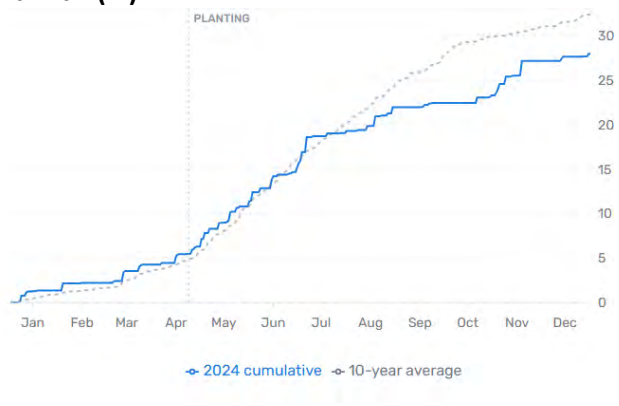
**Summary:**

- There were no significant differences in moisture, yield, or marginal net return.
- The Sentinel Fertigation N-Time® management system applied 32.8 lb N/ac more nitrogen during the growing season.
- There were significant differences in partial factor productivity and lbs N/bu of grain.
- Sentinel Fertigation N-Time® reduced Partial Factor Productivity (PFP) by 15.1% and nitrogen use efficiency (NUE) by 15.4% compared to Grower N Management.

*This research was partly supported by an award from the USDA-NRCS Conservation Innovation Grants, On-Farm Conservation Innovation Trials, award number NR203A750013G014.*

# Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

**Study ID:** 0811-185-2024-01
**County:** York
**Soil Type:** Hastings silty clay loam, Hastings silt loam
**Planting Date:** 4/23/24
**Harvest Date:** 10/12/24
**Seeding Rate:** 34,000
**Row Spacing (in):** 30
**Hybrid:** Pioneer® 1170AM
**Reps:** 6
**Previous Crop:** Soybeans
**Tillage:** No-Till
**Herbicides:** ***Pre:*** 2 qt/ac Lexar® + 1.5 pt/ac atrazine + 1 oz/ac Anthem Maxx® + 24 oz/ac glyphosate
***Post:*** 2 qts/ac Acuron + 1 pt/ac atrazine + 8 oz/ac DiFlexx® + 24 oz/ac glyphosate
**Seed Treatment:** None
**Foliar Insecticides:** 3.2 oz/ac Firestone® + 6.4 oz Brigade® on 7/18/24
**Foliar Fungicides:** 13.7 oz/ac Trivapro® on 7/18/24
**Fertilizer:** 120 lb N/ac on 4/2/24
**Note:** up to 6% greensnap end of June
**Irrigation:** Pivot
**Rainfall (in):**

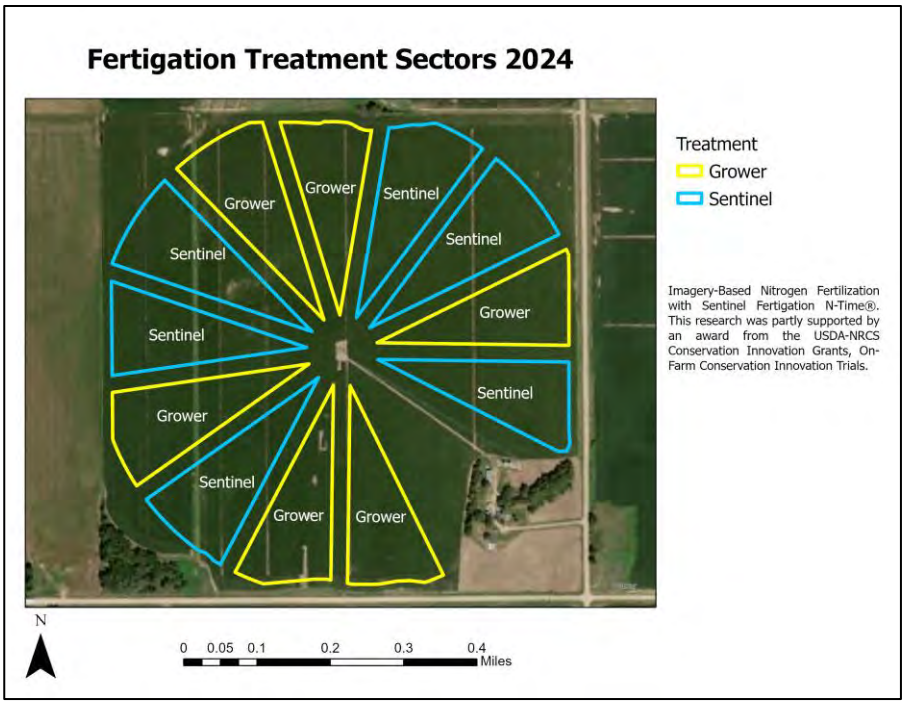



**Post Season Average Soil Samples 0-8" (November 2024):**

| | pH | OM LOI % | Nitrate–N ppm N | M3–P ppm P | Sulfate–S ppm S | K ppm | Ca ppm | Mg ppm | Na ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|---|---|
| Sentinel | 6.6 | 3.2 | 9.4 | 21 | 10.6 | 175 | 1650 | 235 | 20 | 12.7 |
| Grower | 6.5 | 3.4 | 9.6 | 26 | 11.7 | 281 | 1926 | 310 | 23 | 14.9 |

**Introduction:** Corn nitrogen management may be improved by using sensors or imagery to detect and respond to corn N needs during the growing season. Sentinel Fertigation's N-Time® application analyzes multispectral images to deliver fertigation scheduling recommendations. Indicator blocks (small blocks established during the base N applications) with higher (+60 lb-N/ac) and lower (-30 lb-N/ac) nitrogen rates were applied in the field on April 1, 2024, to monitor and determine when fertigation was needed.

If an N application was recommended by N-Time®, the N (lb-N/ac) applied via fertigation (typically 30 or 60 lb-N/ac) is noted in the application table below. Note that different Sentinel sectors of the pivot may receive different recommendations throughout the growing season. This study compared the grower's standard N management to the Sentinel Fertigation N-Time® N management, with six paired sectors of each treatment (each sector was about 9.5 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown below.




**Application Table:** Nitrogen applied throughout the 2024 growing season is included in the table below. N applications (in lb-N/ac) are noted by date, along with products applied at those instances. Sentinel N-Time® began monitoring and directing N fertigation applications following the April 1, 2024, N application. N-Time® directed N applications are shaded in gray to the right of the double vertical lines in the table below.

N was applied using 32% UAN unless otherwise noted. Gray-shaded area to the right of the striped line indicates where Sentinel Fertigation N-Time® dictated N rates. The applied values were averaged across all reps; therefore, if only one out of six replications triggered an application of 30 lb N/ac, a value of 5 lb N/ac is reported as the average treatment N application across reps.

| | 4/1 | 6/13 | 6/25 | 7/27 | | Total N Applied |
|---|---|---|---|---|---|---|
| **Treatment** | ----------*lb N/ac applied*---------- | | | | | |
| **Grower N Management** | 117 [a] | - | 35[b] | 20 [b] | | **172** |
| **Sentinel Fertigation N-Time®** | 117 [a] | 10[b] | - | 20 [b] | - | **147** |

[a] Product used was anhydrous ammonia via indicator block Rx

[b] Product used was 90% 32-0-0 + 10% ATS via fertigation

**Results:**

| | Total N rate (lb/ac) | Moisture (%) | Yield (bu/ac)† | Partial Factor Productivity of N (lb grain/lb N) | lbs N/bu grain | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Grower N Management | 172 | 13.6 A* | 264 A | 86 B | 0.65 A | 1,063 A |
| Sentinel Fertigation N-Time® | 147 | 13.5 A | 261 A | 99 A | 0.56 B | 1,062 A |
| P-Value | N/A | 0.318 | 0.483 | 0.00255 | 0.0018 | 0.927 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre were corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn and $0.5 lb/N.

| | Stand Counts | Stalk Rot (%) | Crude Protein Dry Basis | Ruminant Total Digestible Nutrients (TDN) (%) |
|---|---|---|---|---|
| Grower N Management | 33,500 A* | 10.0 A | 7.825 A | 89.01 A |
| Sentinel Fertigation N-Time ® | 32,333 A | 5.83 A | 7.49 A | 88.72 A |
| P-Value | 0.519 | 0.329 | 0.334 | 0.331 |

**Summary:**

- There were no significant differences in moisture, yield, or marginal net return between treatments.
- The Sentinel Fertigation N-Time® management system called for a 25 lb N/ac reduction in N applications during the growing season.
- There were significant differences in partial factor productivity and lbs N/bu grain. Sentinel Fertigation N-Time® increased Partial Factor Productivity (PFP) by 15% and improved nitrogen use efficiency (NUE) by 13.8% compared to the grower N management.
- Up to 6% greensnap was found in the field at the end of June.

*This research was partly supported by an award from the USDA-NRCS Conservation Innovation Grants, On-Farm Conservation Innovation Trials, award number NR203A750013G014.*

# Evaluation of Poly4 Fertilizer in Corn and Soybean

## Introduction

Poly4 Fertilizer (14% K2O, 19% S, 6% MgO and 17% CaO) was tested in 11 fields to determine the effects on yield. These fields were conducted in Western (6) and Eastern (5) Nebraska.

Poly4 was tested at six sites in corn and five sites in soybean. Details of sites location, planting date, harvest date, environment condition (dryland, irrigated) are shown in Table 1. Sites 6 and 7 were conducted in small plots at the South-Central Agricultural Laboratory (SCAL). All other sites were conducted in farmers' fields with precision agriculture techniques. The fertilizer was broadcasted using the prescription map provided beforehand. All machines were calibrated with the product before the application (Figure 2). Initial soil data summarized by the site is presented in Table 2. Site 1 shows K values below the critical value. OM values ranged from 0.7 to 3.7%. Besides site 4 and 10, all other sites were well provided with P. Irrigation water analysis results are shown in Table 3. Values are within normal ranges for Nebraska. Soil test (before application), irrigation water quality, NDVI and NDRE at V8, R1 (corn) and R1 R5 (soybean) are depicted in this report.

## Experimental design and treatments

Treatments:

- T1: Farmer's practice
- T2: Farmer's practice + 180 lb/ac of Poly4 broadcasted at preplant.

The experimental design was a randomized complete strip block design with four replications. The plot size strip treatments for farmers' fields width multiple of the combine, length: field length.

## Results

**Table 1:** 2024 Project Details.

| Site ID | Crop | County | Environment | Poly4 broadcast date | Planting date | Harvest date | Variety Brand | Variety Hybrid |
|---|---|---|---|---|---|---|---|---|
| 1 | Corn | Butler | Dryland | 5/2/2024 | 5/1/2024 | 10/15/2024 | Golden Harvest® | G14B65-DV |
| 2 | Soybean | Butler | Irrigated Pivot | 5/2/2024 | 5/18/2024 | 10/02/2024 | Golden Harvest® | GH3043E3 |
| 3 | Corn | Platte | Irrigated Pivot | 5/13/2024 | 5/13/2024 | 10/18/2024 | Dekalb® | DKC 63-90, 108-64 |
| 4 | Corn | Platte | Irrigated Furrow | 5/13/2024 | 5/13/2024 | 10/21/2024 | Dekalb® | DKC 63-90 RIB |
| 5 | Soybean | Platte | Irrigated Furrow | 4/20/2024 | 4/24/2024 | 10/04/2024 | Asgrow® | AG27XF3 |
| 6 | Soybean | Morrill | Irrigated Linear | 4/19/2024 | 5/16/2024 | 10/11/2024 | Asgrow® | Asgro AG 30XF2 |
| 7 | Corn | Morrill | Irrigated Linear | 4/19/2024 | 5/11/2024 | 10/09/2024 | Dekalb® | DKC 59-82RIB |
| 8 | Corn | Keith | Irrigated Pivot | 5/10/2024 | 5/7/2024 | 10/23/2024 | Dekalb® | DCK 101-33RIB |
| 9 | Soybean | Keith | Irrigated Pivot | 5/10/2024 | 5/11/2024 | 10/05/2024 | Asgrow® | AG27XF3 |
| 10 | Corn | Keith | Irrigated Pivot | 5/10/2024 | 5/5/2024 | 11/05/2024 | -- | -- |
| 11 | Soybean | Keith | Irrigated Pivot | 5/10/2024 | 5/7/2024 | 10/01/2024 | Pioneer® | P25A04X |

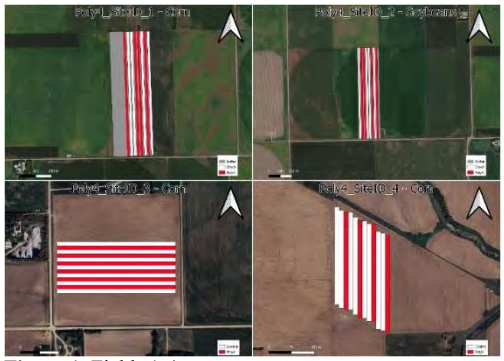


**Figure 1**: Fields 1-4.

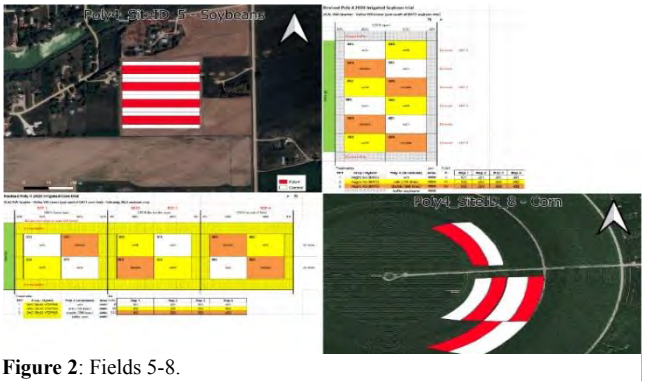


**Figure 2**: Fields 5-8.

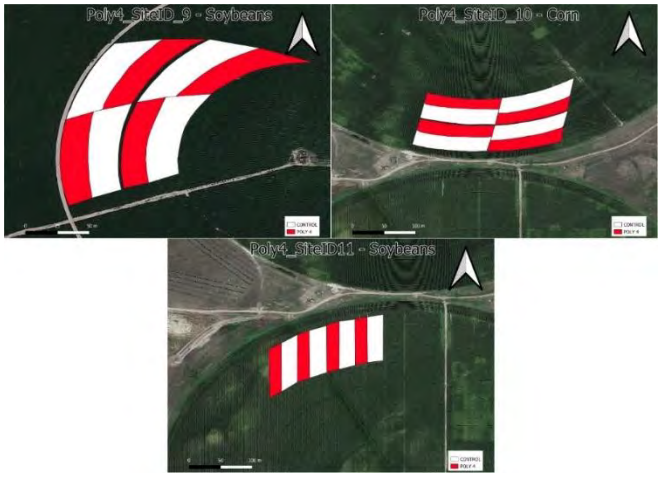



**Figure 3**: Fields 9-11.

**Figure 1-3**. Corn and soybean sites layout across Nebraska in 2024. Nine sites were conducted in large plots and using precision agriculture techniques. Sites 6 (corn) and 7 (soybean) were conducted as research plots at the South-Central Agricultural Laboratory, UNL.

**Table 2:** Soil test results for 11 sites across Nebraska in 2024.

| SiteID | 1:1 Soil pH | Organic Matter LOI % | Mehlich P-III ppm P | Potassium ppm K | Sulfate-S ppm S | Calcium ppm Ca | Magnesium ppm Mg | CEC/Sum of Cations me/100g |
|---|---|---|---|---|---|---|---|---|
| **1** | **6.0** | 0.88 | 28.5 | 73 | 5.50 | 777 | 79 | 5.23 |
| **2** | **6.6** | 2.60 | 24.5 | 313 | 13.93 | 2363 | 229 | 14.65 |
| **3** | **6.0** | 3.28 | 20.5 | 251 | 17.93 | 2246 | 302 | 17.13 |
| **4** | **6.2** | 3.35 | 10.8 | 240 | 15.33 | 2366 | 378 | 17.45 |
| **5** | **6.0** | 2.18 | 19.3 | 299 | 23.78 | 3237 | 314 | 19.80 |
| **6** | **6.5** | 3.70 | 30.0 | 298 | 8.90 | 2039 | 232 | 14.70 |
| **7** | **6.9** | 3.30 | 28.0 | 275 | 6.70 | 1981 | 238 | 12.80 |
| **8** | **6.7** | 2.53 | 25.0 | 600 | 6.90 | 1995 | 304 | 14.20 |
| **9** | **6.8** | 2.40 | 26.8 | 580 | 9.08 | 2026 | 325 | 14.48 |
| **10** | **7.0** | 1.73 | 16.0 | 362 | 8.58 | 1733 | 268 | 11.93 |
| **11** | **7.1** | 1.70 | 18.8 | 335 | 7.70 | 1879 | 277 | 12.65 |

**Table 3.** Irrigation water analysis results for 10 sites across Nebraska in 2024.

| Field ID | 2 | 3 | 4 | 5 | 6 / 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|
| **pH** | 7.8 | 7.7 | 8.2 | 7.7 | 7.4 | 7.9 | 7.9 | 7.8 | 8.2 |
| **SAR** | 0.9 | 0.7 | 0.6 | 0.4 | 0.8 | 0.7 | 0.8 | 0.6 | 0.5 |
| **EC** | 0.69 | 0.72 | 0.34 | 0.38 | 0.58 | 0.37 | 0.36 | 0.71 | 0.3 |
| **Magnesium** | 16 | 18 | 8 | 8 | 12 | 8 | 8 | 20 | 9 |
| **Potassium** | 6 | 11 | 9 | 9 | 7 | 7 | 7 | 9 | 7 |
| **Nitrate** | 6.2 | 0.2 | 0.3 | 0.8 | 4.6 | 2 | 2 | 15.7 | 1.8 |
| **Sulfate** | 27 | 25 | 7 | 7 | 22 | 6 | 6 | 34 | 4 |
| **Calcium** | 105.3 | 104.5 | 39.6 | 50.6 | 79 | 40.7 | 42.5 | 102.6 | 36.3 |
| **Cations** | 8.5 | 8.2 | 3.6 | 3.9 | 6.4 | 3.7 | 3.9 | 8.1 | 3.4 |
| **Anions** | 7.9 | 7.9 | 3.4 | 3.8 | 6 | 3.6 | 3.6 | 7.5 | 3 |

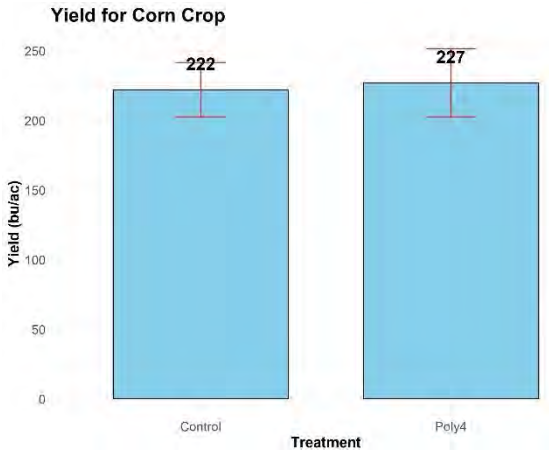



**Figure 4:** Average yield across corn sites (six locations).

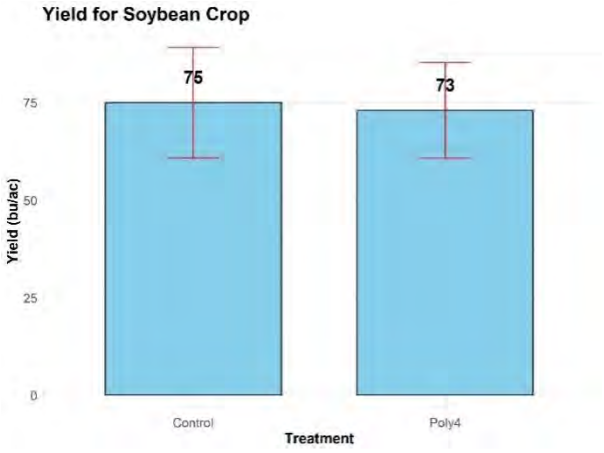



**Figure 5:** Average yield across soybean sites (five locations).

The overall average yield for Poly4 treatment was 227 bu/ac, while the control treatment yielded 222 bu/ac with no statistical differences (p>0.1, Figure 4, left panel). In soybean the overall average yield across sites for poly4 was 73 bu/ac while the control treatment yielded 76 bu/ac with no statistical differences (p>0.1, Figure 5, right panel). Experiment layout, yield, NDRE and NDVI results by site can be found in the supplementary report for the On-Farm sites. A summary of the yield for each experimental site and the difference between control and Poly4 treatment is presented for corn (Figure 4) and soybean (Figure 5).

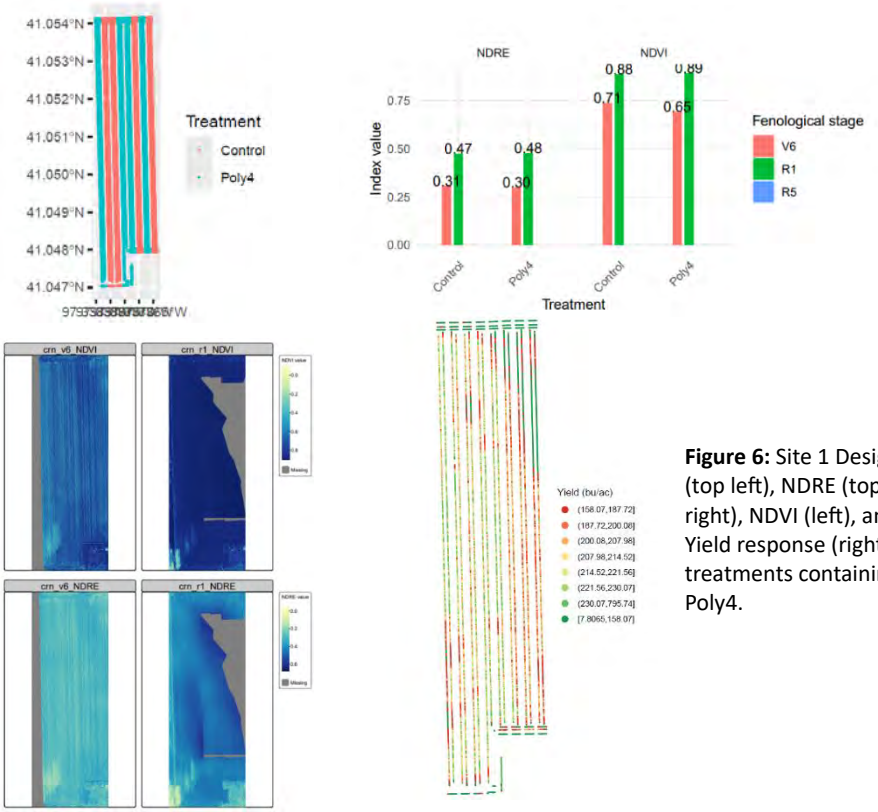



**Figure 6:** Site 1 Design (top left), NDRE (top right), NDVI (left), and Yield response (right) in treatments containing Poly4.

Yield was analyzed considering the spatial variability. This analysis for each single site can be found in the attached PDF. The median per replication is used to compare the treatments. The model is a linear mixed model with the median yield as the response variable and the treatment as the fixed effect, replication as a random effect. Statistical analysis shows no treatment differences (p>0.1).

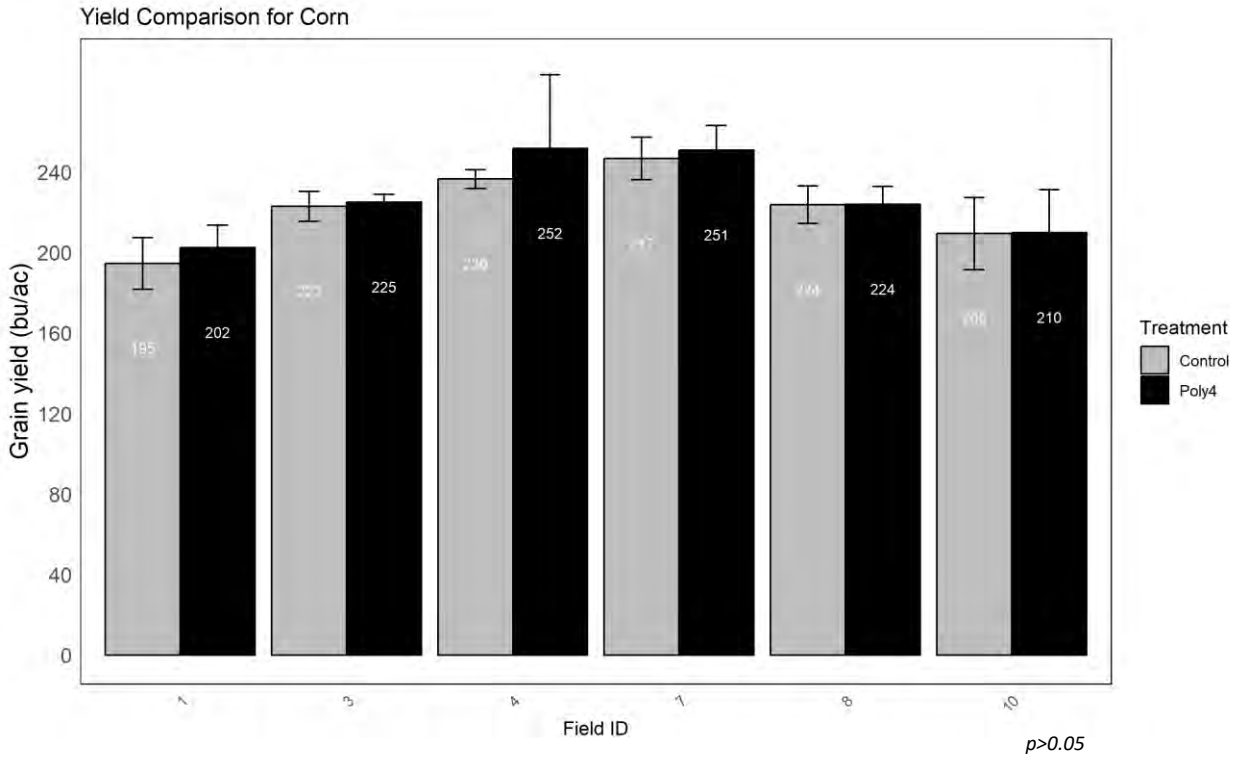



**Figure 7:** Corn yields by site and treatment. There was no significant difference found among treatment means.

Four out of six sites had an increase in yield of Poly4 against control of at least 3.6 bu/ac, with a maximum response of 16 bu/ac (Site 4). Site 8 and 10 registered less than a bushel of yield difference between Poly4 and Control (Figure 4). Statistical analysis shows that no differences were found in all six sites (p>0.1).

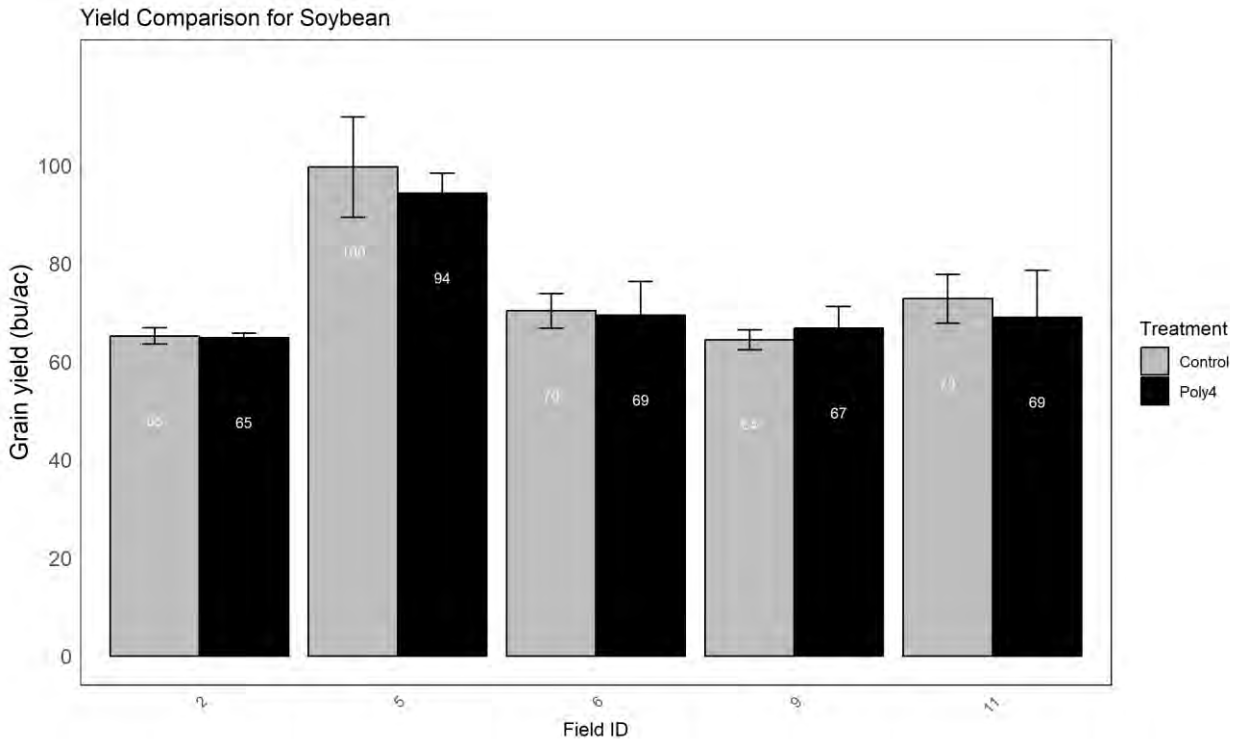



**Figure 8:** Soybean yields by site and treatment. No significant difference in yield was found.

In soybeans, sites 5 and 11 control treatment yielded above Poly4 by 4-6 bu/ac respectively but with no statistical difference. (Figure 8).

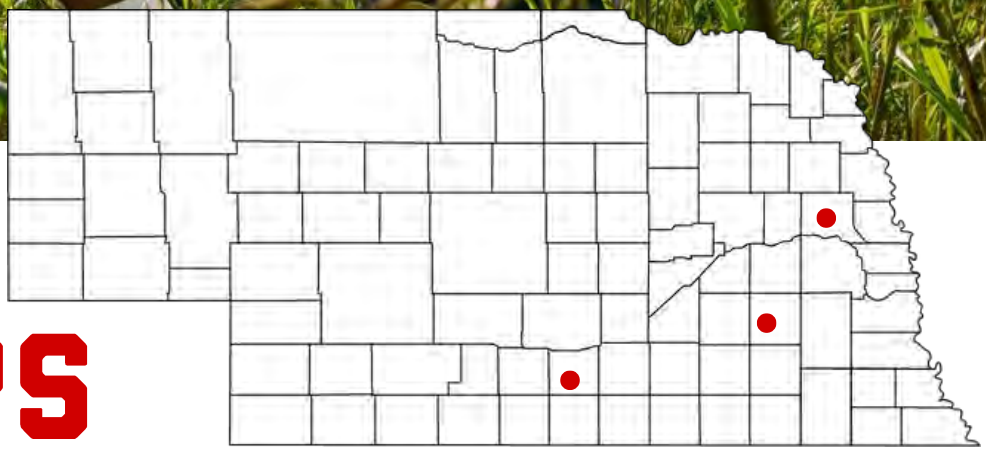
No differences were found among treatments for protein, oil, and starch, but differences were found among sites for these traits (Table 4).

**Table 4.** Corn and soybean protein, oil, and start (corn) grain results for all sites in Nebraska in 2024.

| CROP | VARIABLE | PROTEIN% | OIL % | STARCH % |
|---|---|---|---|---|
| **CORN** | *Poly4* | 8.45 a | 4.48 a | 72.39 a |
| | *Control* | 8.28 a | 4.28 a | 72.21 a |
| | P- value: | 0.157 | 0.302 | 0.681 |
| | **Site** | | | |
| | 1 | 8.65 a | 3.88 b | 72.40 b |
| | 3 | 8.23 b | 4.34 b | 72.51 b |
| | 4 | 7.61 c | 4.31 b | 73.05 a |
| | 7 | 8.52 a | 3.97 b | 72.29 b |
| | 8 | 8.26 b | 4.80 a | 71.49 c |
| | 10 | 8.91 a | 5.06 a | 72.25 b |
| | P-value: | 0.0001 | 0.022 | 0.0003 |
| **SOYBEAN** | *Poly4* | 33.45 a | 19.41 a | |
| | *Control* | 33.42 a | 19.33 a | |
| | P-value: | 0.852 | 0.431 | |
| | **Site** | | | |
| | 2 | 33.78 b | 19.15 a | |
| | 5 | 32.12 c | 19.51 a | |
| | 6 | 33.42 b | 19.43 a | |
| | 9 | 34.41 a | 19.53 a | |
| | 11 | 33.26 b | 19.30 a | |
| | P-value: | 0.0001 | 0.089 | |

*The mean comparison method test was DGC, with a significance level of 0.05.*

**Summary:** Besides some yield trends in corn toward increasing yield with addition of Poly4, no statistical differences were found. It is worth mentioning that the broadcast of the Poly4 was made within two weeks prior to planting and this might pose a limitation for the fertilizer to be used by the crop. Future experimentation can consider early broadcasting.



# COVER CROPS

# Long Term Rye/ No Rye

**Study ID:** 0064099202402
**County:** Kearney
**Soil Type:** Coly-Kenesaw silt loam; Hersh sandy loam
**Planting Date:** 5/9/24
**Harvest Date:** 9/24/24
**Population:** 32,000
**Row Spacing (in):** 30”
**Hybrid:** Beck’s® 5864AM
**Reps:** 4
**Previous Crop:** Soybean
**Tillage:** Strip-till
**Herbicides:** ***Pre:*** 2 qts/ac Fulltime® + 44 oz/ac Roundup PowerMAX® ***Post:*** 2.5 qts/ac Acuron® + 24 oz/ac Roundup PowerMAX® + 5oz/ac Status®
**Seed Treatment:** Pivot Bio PROVEN® 40
**Foliar Insecticides:** 7.3 oz/ac bifenthrin
**Foliar Fungicides:** 7.1 oz/ac Veltyma® on 7/19/24 and 8/8/24

**Fertilizer:** 169 lb N/ac, 51 lb P/ac, 9 lb K/ac, 6 lb S/ac
**Irrigation:** Pivot
**Rainfall (in):**


**Introduction:** This study compared the effects of a cereal rye cover crop on the following cash crop yield. This is the eighth year of the study, with cereal rye and check strips maintained in the same location from year to year. Rye was drilled in 10" rows in the fall of 2023, at a rate of 56 lbs/ac. The rye was terminated with the pre-plant herbicide application of 40 oz/ac Roundup PowerMAX ® in the spring. Corn was planted in 30" rows on May 9, 2024. Corn stand counts were taken on June 6 and June 18. Soil samples were collected for all replications of the study to determine the impact of the cereal rye cover crop on soil organic matter after seven years.

**Results:**

| | Soil OM (0-8") (%) | Stand Counts (plants/acre) June 6 | Stand Counts (plants/acre) June 18 | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| No Rye (Check) | 2.1 A* | 31,750 A | 31,625 A | 235 A | 1032 A |
| Rye | 2.2 A | 32,000 A | 30,500 A | 236 A | 997 B |
| P-Value: | 0.87 | 0.77 | 0.57 | 0.2 | 0.09 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.30/bu corn, rye cost of $29/ac for seed and establishment.

**Summary:**

- There were no significant differences in soil OM, stand counts, or yield. In year eight, no significant yield difference was found between the addition of rye (235.78 bu/ac) and no rye (235.2 bu/ac).
- There was a significant difference in marginal net return, with the no rye strips ($1032/ac) returning more than the rye strips due to the additional costs of seed and establishment of the rye ($997/ac).
- Other cover crop benefits such as reduced erosion, nutrient cycling and weed control were not looked at by this study.

## Summary of Previous Years

### 2017

In year one (2017), cover crops were drilled on November 1, 2016. Rye was terminated with glyphosate on May 5, 2017. Soybeans were drilled in 10” rows on May 8, 2017.

**Results:**

| | Moisture (%) | Soybean Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Check | 12.0 B* | 80 A | 714.25 A |
| Cover Crop - Rye | 12.1 A | 81 A | 692.20 B |
| P-Value | 0.058 | 0.682 | 0.008 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $8.90/bu soybean and $24.30 cover crop cost.

### 2018

In year two (2018), cover crops were drilled on October 21, 2017, following soybean harvest. Cattle pastured the rye in March and early April. The rye was terminated with glyphosate on May 6, 2018, at a height of approximately 15”. Corn was planted into the strips on April 28, 2018. The field was replanted on May 17, 2018, due to poor stand resulting from fertilizer salt injury.

**Results:**

| | Moisture (%) | Corn Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Check | 15.5 A* | 227 A | 733.70 A |
| Cover Crop - Rye | 15.6 A | 228 A | 713.43 B |
| P-Value | 0.219 | 0.454 | 0.014 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $3.23/bu corn and $24.30 cover crop cost.

### 2019

In year three (2019), cover crops were drilled on November 1, 2018, following corn harvest. The rye was terminated with glyphosate on May 5, 2019, at a height of approximately 12”. Soybeans were planted into the strips on May 13, 2019.

**Results:**

| | Moisture (%) | Soybean Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Check | 11.9 A | 86 B | 694.94 A |
| Cover Crop - Rye | 11.9 A | 87 A | 674.64 B |
| P-Value | 1 | 0.017 | 0.002 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.

## Summary of Previous Years, Continued

### 2020

In year four (2020), yields were not reported.

### 2021

In year five (2021), cover crops were drilled on September 2, 2020, following corn harvest. Sheep grazed on the rye from January 1 to April 1, 2021. The rye was terminated with herbicide on April 26. The rye was approximately 30” tall at the time of termination. Soybeans were planted into the strips on May 2, 2021.

**Results:**

| | Rye Biomass (lb/ac) | June 27 Stand Count (plants/ac) | Sept. 28 Stand Count (plants/ac) | Grain Moisture (%) | Soybean Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Check | - | 144,123 A | 139,333 A | 11.2 B* | 92 A | 1,085 A |
| Cover Crop – Rye | 2,248 | 145,865 A | 141,075 A | 11.4 A | 92 A | 1,053 B |
| P-Value | - | 0.719 | 0.572 | 0.015 | 0.813 | 0.015 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11.80/bu soybean and $30/ac for cover crop seed and drilling cost.

### 2022

In year six (2022), yields were not reported.

### 2023

In year seven (2023), cover crops were drilled on September, 5, 2022 ,following corn harvest. The rye was chemically terminated on May 4, 2023. The rye was approximately 18-24" tall at termination timing. Corn was planted on May 15, 2023 in 30” rows.

**Results:**

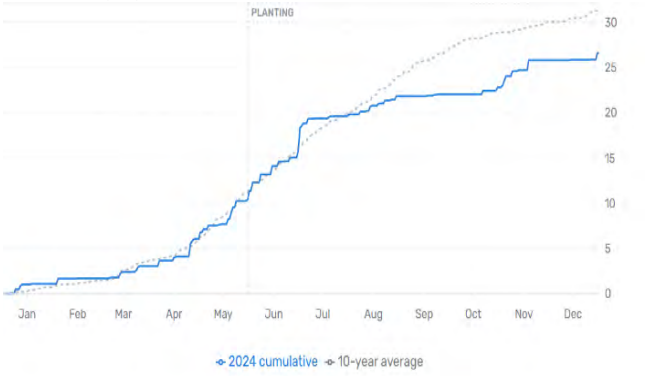
| | Soil OM (0-8") (%) | Early Stand Count (plants/ac) | Harvest Stand Count (plants/ac) | Moisture (%) | Soybean Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| No Rye | 1.5 A* | 134,979 A | 117,998 A | 8.4 A | 78 A | 1,070 A |
| Cover Crop - Rye | 1.4 A | 123,223 A | 120,610 A | 8.4 A | 74 B | 1,004 B |
| P-Value | 0.690 | 0.191 | 0.816 | 0.638 | 0.027 | 0.015 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $13.76/bu soybean and $13/ac for the cover crop treatment.

# Long Term Add Grazed Cover Crop into Rotation - Year 2

**Study ID:** 1395159202402
**County:** Seward
**Soil Type:** Butler silt loam terrace 0-1% slopes, Lamo silty clay loam occasionally flooded, Muir silt loam 0-1% slopes and 1-3% slopes and rarely flooded, Hastings silty clay loam 3-7% slopes severely eroded
**Planting Date:** 5/30/24
**Harvest Date:** 9/30/24
**Population:** 140,000
**Row Spacing (in):** 30”
**Variety:** Connect™ CT2323E
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 5 oz/ac Verdict® + 12 oz/ac Outlook®
***Post:*** 32 oz/ac Liberty® + 32 oz/ac Enlist One® + 1.3 pt/ac Dual II Magnum® applied 6/28/24. 32 oz/ac Enlist One® + 32 oz/ac glyphosate on 7/13/24.

**Seed Treatment:** None
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** None
**Irrigation:** Pivot, Total: 8”
**Rainfall (in):**




**Introduction:** The goal of this study is to look at the impacts of adding a grazed sorghum sudan crop compared to the regular field crop over time. Yield, total economics of the crop vs. grazed crop over time (Table 3), and nutrient differences such as P and K will be tracked. An area grower was showing how strip grazing of a cover crop added into the field crop rotation led to better phosphorus (P) distribution in that area of the field and higher yields. This grower wanted to test this topic as a study to see if he could also see better P distribution and higher yields in the area where grazed sorghum sudan is added into the crop rotation.

**In Year 1,** cereal rye was harvested for small grain ryelage. Then, Mega Green sorghum sudan was planted May 20, 2023, at around 18 lb/ac in a large block with corn (Channel® 213-19 seeded at 32,000 seeds/ac on May 21, 2023) surrounding it. There are four reps in this study. The sorghum sudan was split into grazing areas and grazed with 66 heifers for 79 days. The sorghum sudan grazing began when it was around 30” tall.

Yield/Economics: Because this is a unique cropping systems study, the on-farm research team wasn’t sure how to compare the yield and economics of year one. The results are shared here. The corn was harvested on 11/1/23 and averaged 241 bu/ac. With a price of $4.50/bu, the total income after crop expenses was $653.46/ac. The sorghum sudan, at time of corn harvest, had resulted in 79 grazing days of 26.9 acres. The entire sorghum sudan area had not been grazed. The associated income from the grazing was estimated to be $241.01/ac at the time of corn harvest for comparison.

However, significant sorghum sudan biomass was left in the field. Due to the nature of the fence around the perimeter, the sheer growth rate and biomass of the sorghum sudan, and number of cattle available compared to the acres, the grower felt there were grazing opportunities beyond what was captured. The remainder of the area was grazed during the winter, including for calving, which provided additional value to the sorghum sudan. The grower didn’t attempt to measure how much additional grazing there was. For a quick value, he thought an additional $15/ac value might be in line. Adding $241.01 + $15 would result in a total value of $256.01/ac for the sorghum sudan area. The grower felt there is a large learning curve on grazing this way, and efficiency improvements could be made.

Prior to grazing the sorghum sudan in the winter of 2023-2024, biomass samples were collected in a 36” by 36” square to determine quality of both the previously grazed area and non-grazed area. Results are shown in Table 1.

**Table 1.** Quality of ungrazed sorghum sudan and grazed regrowth of sorghum sudan on 1/22/24. All results listed as dry matter basis.

| Sorghum Sudan Sample | Crude Protein | Acid Detergent Fiber (ADF%) | Total Digestible Nutrients (TDN%) | Relative Feed Value (RFV) | Relative Feed Quality (RFQ) |
|---|---|---|---|---|---|
| **Grazed regrowth** | 2.08 | 55.49 | 44.54 | 56 | 32 |
| **Ungrazed** | 6.48 | 37.50 | 55.32 | 87 | 96 |

**Pictures:** (Top Photo) September 7, 2023, showing the corn area (far left), grazed sorghum sudan area (middle) and ungrazed sorghum sudan area (right). The other corn area is not pictured and is to the right of the ungrazed sorghum sudan area. The goal was to graze the entire sorghum sudan area during the growing season, but the biomass was more than the cattle could eat during that time.

(Lower left photo) A recently grazed sorghum sudan area. (Lower right photo) The non-grazed area was nearly 5'7" on September 7, 2023.


**In Year 2,** soybeans were planted across the entire field area. There were no additional treatments added as the goal was to see if any differences existed between the sorghum sudan grazed area vs. the corn for grain area.

**Table 2.** Results 2024

| | Average Stand Counts (plants/acre) Only 2 reps, no stats | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Check (No Cover Crop) | 108,750 | 8.8 A* | 69 A | 757 A |
| Grazed Cover Crop | 113,750 | 8.7 A | 70 A | 774 A |
| P-Value: | -- | 0.4 | 0.6 | 0.6 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans.

**Summary:**

- There were no significant differences in moisture, yield, or marginal net return.
- No significant yield difference was found between the addition of grazed sorghum sudan grass to a corn/soybean rotation (70.4 bu/ac) against no cover crop (68.8 bu/ac).
- With this, the addition of a feed source in 2023 for grazing purposes did not mitigate yield in 2024.

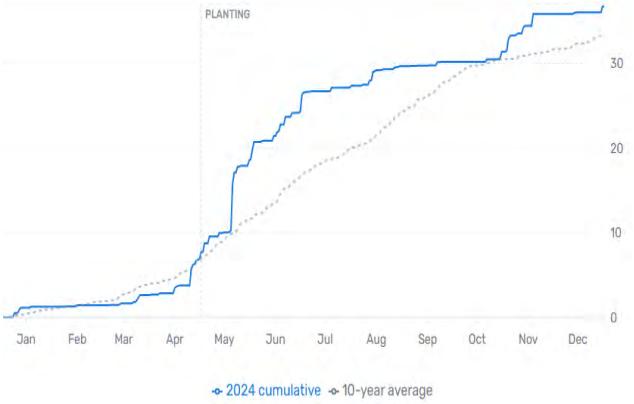
**Table 3.** Two crop year economic analysis summary of this study, presented in $/ac.

| | 2023 Corn | 2024 Soy | 2025 | 3-year Total |
|---|---|---|---|---|
| Check (No Cover Crop) | $653.46 | $757 | N/A | *$1410.46* |
| Grazed Cover Crop | $256.01 | $774 | N/A | *$1030.01* |

# Soybean Planting Date in Cereal Rye Cover

**Study ID:** 0029053202401
**County:** Dodge
**Soil Type:** Moody silty clay loam
**Planting Date:** Varied
**Population:** 120,000
**Row Spacing (in):** 30”
**Reps:** 8
**Previous Crop:** Seed Corn
**Tillage:** No-till
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** None
**Note:** Rye was planted 9/15/23 and 10/1/23. Terminated at boot stage with glyphosate.
**Irrigation:** Pivot

**Rainfall (in):**




**Introduction:** Cover crops and especially cereal rye are increasing in popularity in Eastern Nebraska. With this, there is discussion about termination method and timing. Planting green soybeans is the method of planting into living rye, with termination following shortly. The purpose of this study was to determine the effect of planting soybeans before and after rye was killed. The treatments consisted of:

1. April 12 soybean planting **(planted into green cover)**
2. May 10 soybean planting **(planted into terminated rye)**

Yield was collected during soybean harvest to determine the effect of cereal rye termination timing.

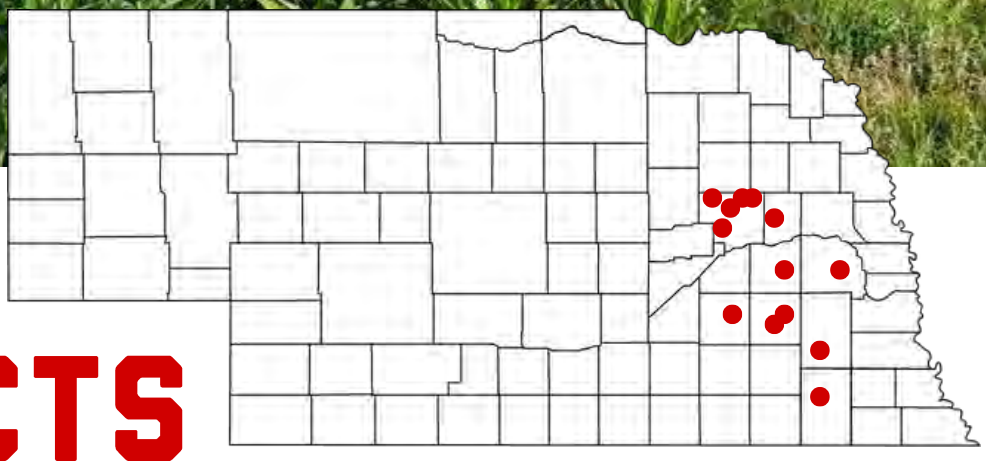
**Results:**

| Planting Date | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| April 12- Plant into green rye cover | 10.3 B | 89 A | 983 A |
| May 10- Plant into terminated rye cover | 11.1 A | 81 B | 892 B |
| P-Value: | 0.05 | 0.1 | 0.1 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans. Cost of cover crops was constant across both treatments.

**Summary:**

- There were significant differences in moisture, yield, and marginal net return.
- The later planting date with the terminated rye had reduced yields compared to planting earlier into a green cover crop.
- Cover crop termination timing may have alternative benefits as well, such as weed suppression and erosion control.
- Further projects in other locations and testing various cover crops can discover more findings in this area.

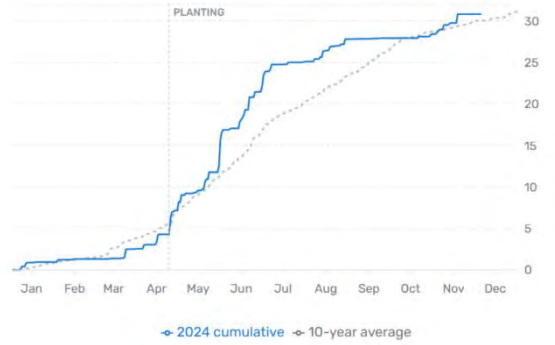


# HICCIP PROJECTS

# Highboy Cover Crop Interseeding Project Report – 1-Year Project

**Study ID:** 1550141202401
**County**: Platte
**Soil Type:** Belfore silty clay loam, 0-2% slope
**Planting Date:** 4/25/24
**Harvest Date:** 10/3/24
**Seeding Rate:** 135,000
**Row Spacing (in):** 36”
**Fertilizer:** 30 t/ac cow manure in 2020
**Irrigation:** Yes

**Variety:** Asgrow® AG30XF4
**Reps:** 3
**Previous Crop:** Corn
**Tillage:** No-Till
**Herbcides:** ***Pre:*** 6 oz/ac Fierce® EZ + 32 oz/ac Roundup® applied 4/22/24. ***Post:*** 22 oz/ac Xtendimax® + 8oz/ac Section® III + 32oz/ac Roundup® applied 6/7/24
**Rainfall (in):**


**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in the Fall and Spring each year. For years where the producer plants soybean in rotation, cover crops are established in the interseeded strips after soybean harvest.

In this field, cereal rye was interseeded at 70 lb/ac on August 29, 2023, at corn stage R5. With dry conditions at interseeding, 0.5” of irrigation was applied to aid cover crop establishment.

Soil samples for soil nitrate content were taken on October 15, 2023 (Fall 2023) and on March 21, 2024 (Spring 2024) for each foot depth, up to 3 feet, on both treatments with three replications, Check (no cover crop) and Interseeded R5. Cover crop stand count was assessed on October 15, 2023, and aboveground cover crop biomass was collected on April 1, 2024.

**Table 1.** Fall (Oct. 15, 2023) and Spring (Apr. 1, 2024) soil sampling for nitrate (0-3') in Check vs. Interseeded at R5 corn.

**Figure 1:** Comparison of soil nitrate levels in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn.

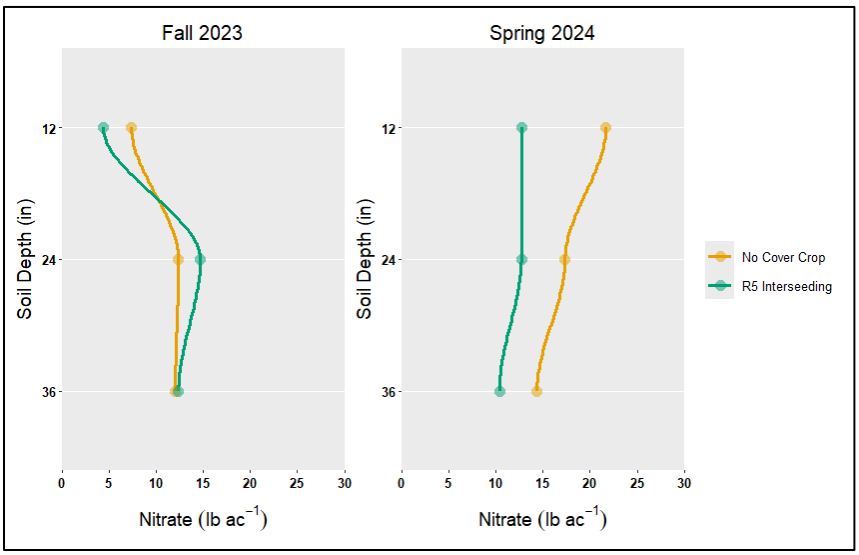



**Table 2.** Fall 2023 and Spring 2024 cover crops aboveground cover crops biomass.

| | Fall 2023 | Spring 2024 |
|---|---|---|
| | Cover Crop Biomass (lb/ac) | Cover Crop Biomass (lb/ac) |
| Interseeded R5 | 500.2 | 5117.4 |

**Table 3.** 2024 soybean yield at check and interseeded cover crop treatments.

| | 2024 Soybean Yield (bu/ac)† |
|---|---|
| R5 Interseeded | 90 A |
| Check (No cover crop) | 92 A |
| P-Value | 0.49 |

†All results were not significantly different at 90% confidence level.

**Summary:**

- There were no significant differences in soil nitrate between treatments in all depths during the Fall of 2023.
- Significant differences between treatments were observed in soil nitrate at the 0-1' foot depths in the Spring of 2024, with lower nitrate concentration observed on Interseeded R5 treatment, compared with the Check (no cover crop). This indicates that cover crops can potentially use residual soil N during the off-season.
- At cover crop termination, total biomass was approximately 5117.4 lb/ac.
- Weeds were not present in the area during both Fall and Spring sampling dates.
- No differences in yield were found during year 1.

# Highboy Cover Crop Interseeding Project Report – Year 1

**Study ID:** 1554141202401
**County:** Platte
**Soil Type:** Loamy fine sand
**Reps:** 4
**Previous Crop:** Soybean

**Tillage:** No-Till
**Irrigation:** Yes
**Rainfall (in):**



**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to show interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in the Fall and Spring each year. For years where the producer plants soybean in rotation, cover crops are established in the interseeded strips after soybean harvest. Check and interseeded treatments are conducted on the same location for 3 years, allowing to identify the effect of cover crops and no cover crops on soil residual nitrogen and crop yield. Year 1 began in the Fall of 2023.

In this field, a mix of cereal rye, turnip and rapeseed was interseeded at 70 lb/ac on September 1, 2023, at corn stage R5. With dry conditions at interseeding, 0.5” of irrigation was applied to aid in cover crop establishment.

Deep soil sampling for nitrates was taken on November 7, 2023 (Fall 2023) and on May 8, 2024 (Spring 2024) on each foot depth, up to 6 feet, on both treatments and four replications, Check (no cover crop) and Interseeded R5. Soil samples were analyzed for nitrate on each soil depth. Aboveground cover crop biomass was collected on same day as soil sampling on Fall 2023. However, in the following spring, aboveground cover crop biomass was taken on April 30, a few days prior to termination.

**Figure 1:** Cover crop biomass when it was collected on April 30, 2024. The top picture shows the cover crop strip, and the bottom picture shows the no cover crop strip with horseweed/marestail.

**Results:**

**Figure 1.** A visual comparison of soil nitrate levels in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn.

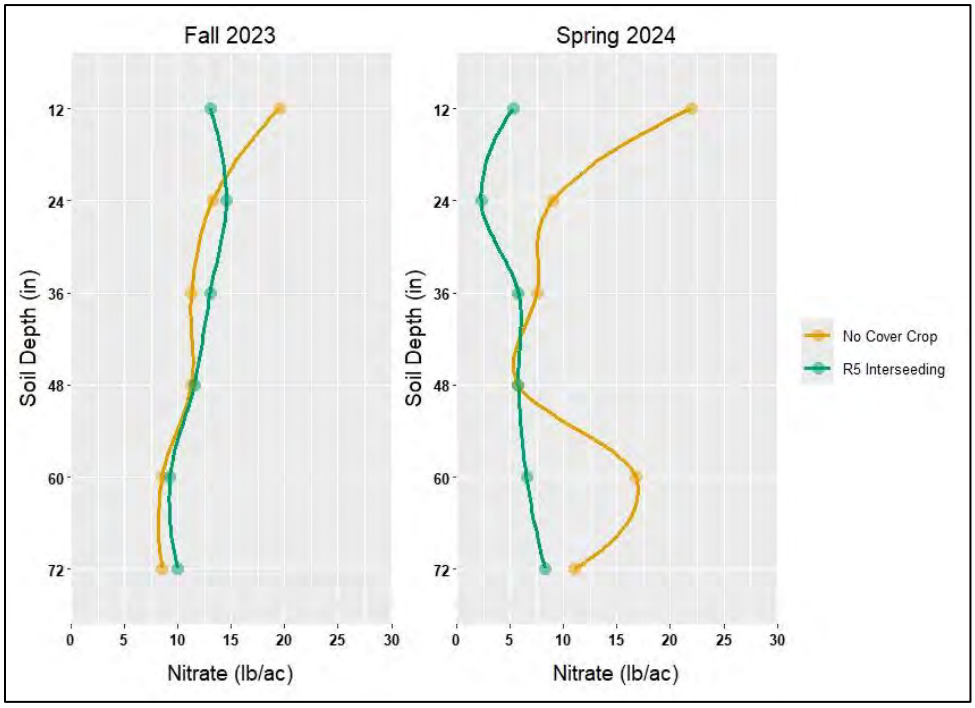


**Figure 2.** Comparison of cover crop biomass in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn.

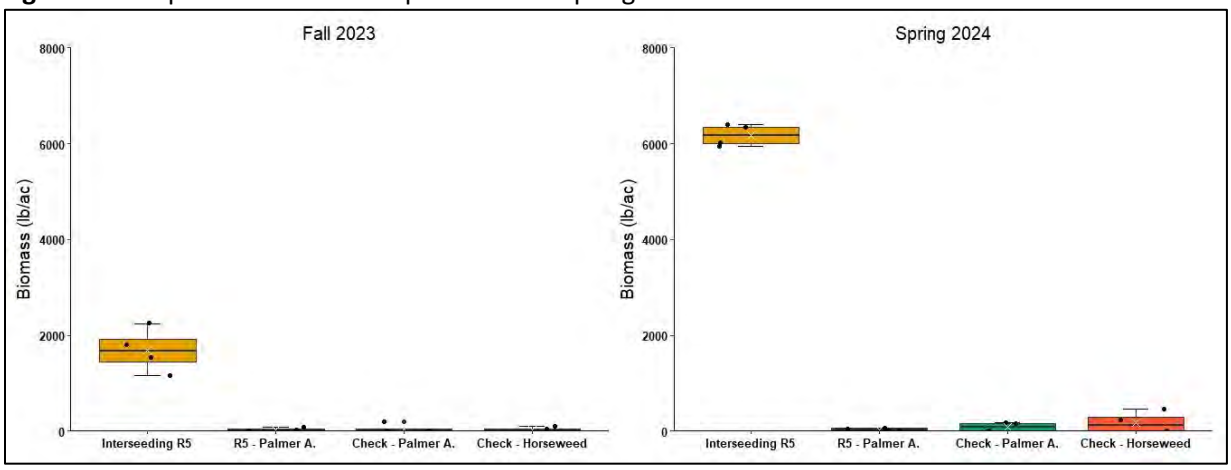
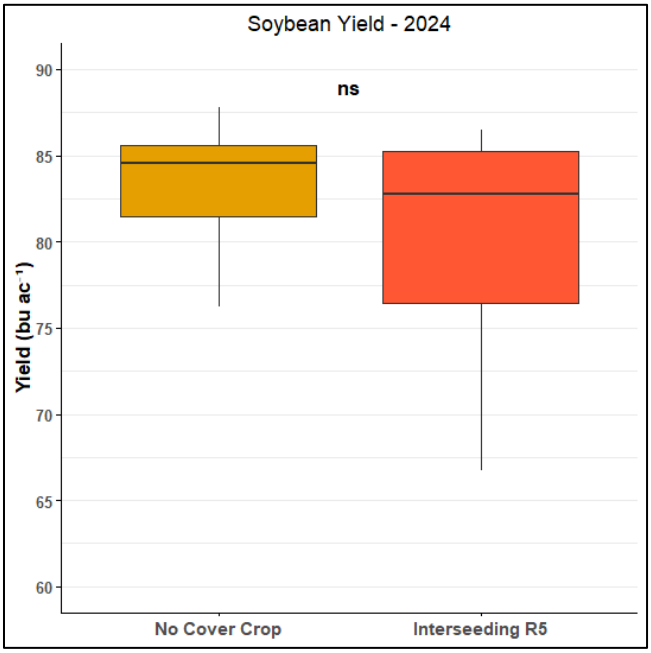



**Table 3.** Soybean yield in 2024 in Interseeded at R5 vs Check (No cover crop) treatments.

| | 2024 Soybean Yield (bu/ac)† |
|---|---|
| Interseeded R5 | 80 A |
| Check (No cover crop) | 84 A |
| P-Value: | 0.054 |

†All results were not significantly different at 95% confidence level.

**Figure 3.** Soybean yield in 2024 in Interseeded at R5 vs Check (No cover crop) treatments.




ns: non-significant differences in yield between treatments.

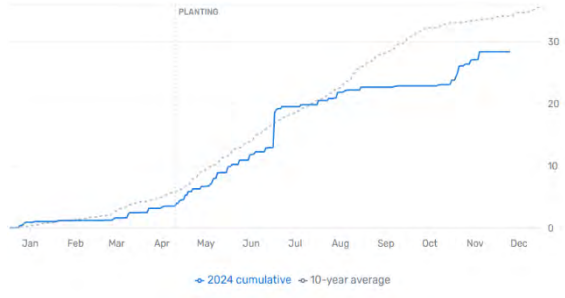
**Summary:**

- There was significant difference in soil nitrate among all treatments for the first foot depth (0-1') in the fall of 2023. At deeper soil depths there were no differences between treatments.
- Significant differences between treatments were observed in soil nitrate at the 0-1' and 1-2' foot depths in the spring of 2024, with lower nitrate concentration observed on Interseeded R5 treatment, compared with the Check (no cover crop). This indicates that cover crops can potentially use residual soil N during the off-season.
- For cover crop biomass, significant differences were observed between Fall 2023 and Spring 2024 sampling. At termination, total biomass was approximately 6,176 lb/ac.
- Palmer amaranth was observed in the Interseeded R5 treatment strips but no significant difference was observed between sampling timings.
- Horseweed/marestail and Palmer amaranth were also observed in the Check treatment with no significant difference between sampling timings, despite the increase in biomass of both species.
- No significant difference in soybean yields were detected in Year 1.

# Highboy Cover Crop Interseeding Project Report – Year 1

**Study ID:** 1548109202401
**County:** Lancaster
**Soil Type:** Aksarben silty clay loam
**Crop:** Soybean
**Planting Date:** 4/14/24
**Harvest Date:** 10/16/24
**Seeding Rate:** Variable rate, average 157,000
**Row Spacing (in):** 15”
**Variety:** Connect® CT3423E

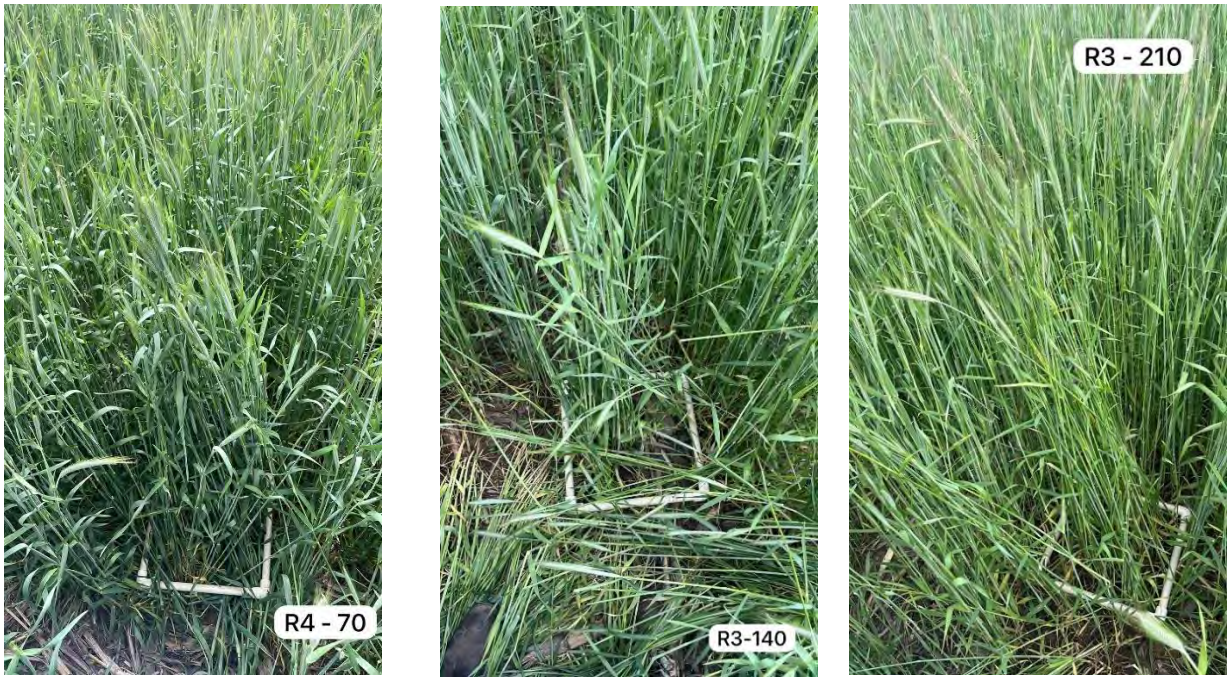
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** None
***Post:*** Roundup®, 2-4-D, Warrior®, and Clense®
**Fertilizer:** 12-40-0-5-1, 0-0-60 fall application
**Irrigation:** None
**Rainfall (in):**


**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at R5 corn stage utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing R5 interseeding and to compare soil nitrate levels in the no-cover crop check vs. interseeded treatments in the fall and spring each year. The studies will be conducted in the same field for 3 years. Year 1 began in the Fall of 2023.

Cereal rye was interseeded at 70, 140 and 210 lb/ac on September 21, 2023. A no-cover crop treatment (check) was included for comparison. The four interseeding treatments were established in 100 ft wide field length strips with four replications.

Deep soil sampling for nitrates was collected on November 8, 2023, and on May 11, 2024, to 6 feet in 1-foot increments, across all four treatments and four replications. Soil samples were analyzed for nitrate on each soil depth. Aboveground cover crop biomass was collected on the same day as soil sampling in fall 2023. However, in the following spring of 2024, aboveground cover crop biomass was taken several days prior to cover crop termination, on May 12, 2024, before planting soybeans. Yield data was collected in 2023 and 2024.




**Figures 1-3:** Cover crop biomass sampling on May 12, 2024. 70 lb/ac (left), 140 lb/ac (middle) and 210 lb/ac (right).

**Results:**

**Figure 1.** Soil nitrate (lb/ac) in Spring vs. Fall for Check vs. Interseeded across 3 seeding rates in R5 corn.

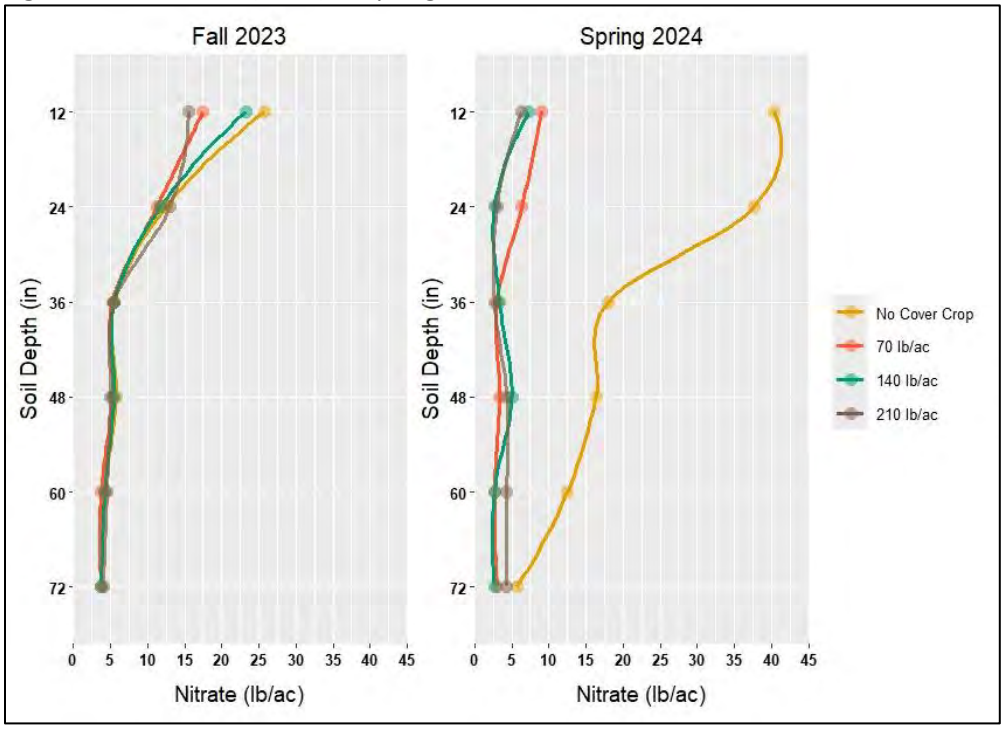


**Figure 2.** Cover crop biomass in Fall 2023 vs Spring 2024 on Check vs. Interseeded treatments in R5 corn.

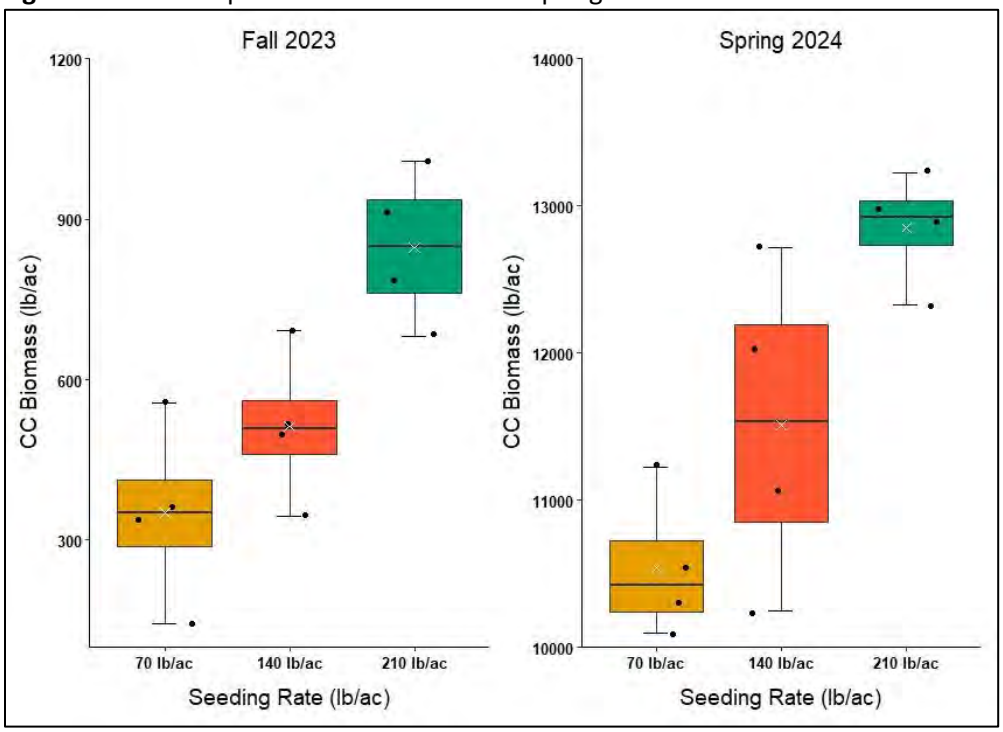
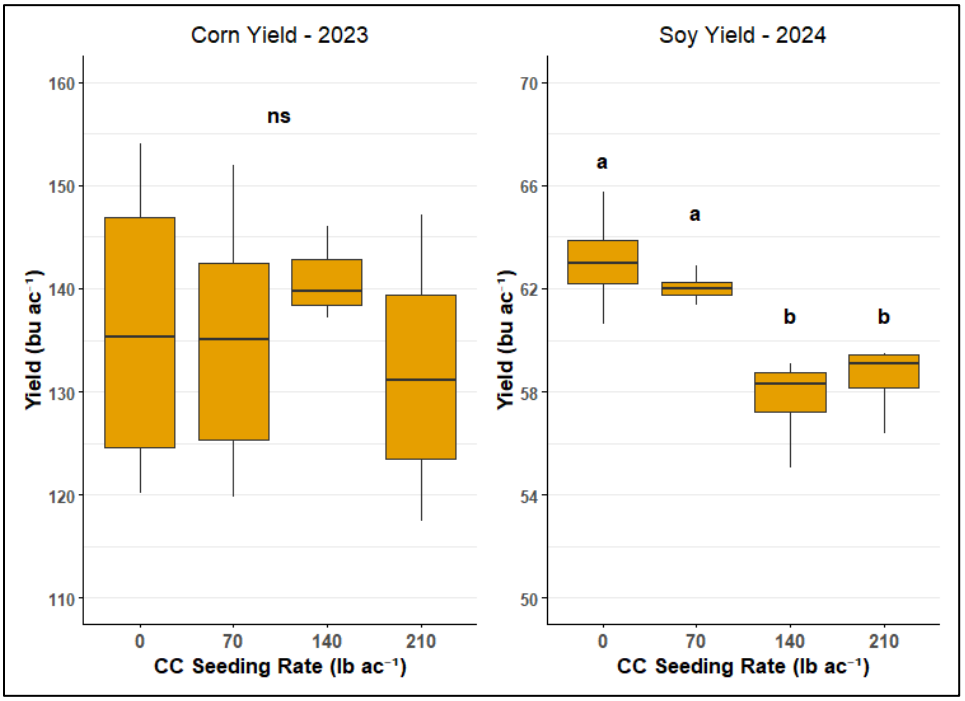



**Figure 3.** Corn yield (Year 1) and soybean yield (Year 2) among treatments. Check vs. Interseeded rates at R5 corn.



**Summary:**

- There were no significant differences in soil nitrate levels among treatments for each soil depth in the fall of 2023.
- For the spring 2024 soil sampling, significant differences between the cover crop treatments and no cover crops were observed in soil nitrate levels at all soil depths other than at 5-6 feet, which was not significantly different.
- More nitrate were observed across the depths from fall of 2023 moving to spring of 2024 when comparing all cereal rye seeding rates with no-cover crop treatment.
- Cereal rye biomass at termination was significant different between 70 lb/ac and 210 lb/ac. However, increasing seeding rate also increased cover crop seed cost per acre.
- Tansy mustard weeds were observed only on check strips, but no weeds were observed in the cover crop treatments during spring 2024 biomass collection, suggesting that cover crops can suppress weeds during winter and spring.
- In 2023, no differences in yield were observed. However, in 2024, soybean yield differences were detected, with lower soybean yields for higher interseeded rates of 140 and 210 lb/ac.

# Highboy Cover Crop Interseeding Project Report – 1-Year Project

**Study ID:** 1315141202403
**County:** Platte
**Soil Type:** Nora-Crofton complex
**Planting Date:** 4/20/24
**Harvest Date:** 10/05/24
**Seeding Rate:** 127,000
**Row Spacing (in):** 30”

**Hybrid**: Channel® 312RXF and Pioneer® P28A4X
**Reps:** 3
**Previous Crop:** Corn
**Tillage:** Strip-Till
**Irrigation:** Yes, Pivot
**Rainfall (in):**



**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in the Fall and Spring each year. For years where the producer plants soybean in rotation, cover crops are established in the interseeded strips after soybean harvest.

In this field, a mix of cereal rye, turnip and rapeseed was interseeded at 70 lb/ac on August 31st, 2023, at corn stage R5. With dry conditions at interseeding, 0.5” of irrigation was applied to aid cover crop establishment.

Soil samples for nitrates were taken on October 15, 2023 (Fall 2023) and on March 21, 2024 (Spring 2024) for each foot depth, up to 3 feet, on both treatments and three replications, Check (no cover crop) and Interseeded R5. Soil samples were analyzed for nitrate on each soil depth. Cover crop stand count was assessed on October 15, 2024, and aboveground cover crop biomass was collected on April 1, 2024.

**Figure 1.** Comparison of soil nitrate levels in Spring vs. Fall in Year 1 Drill vs. Interseeded at R5 corn.

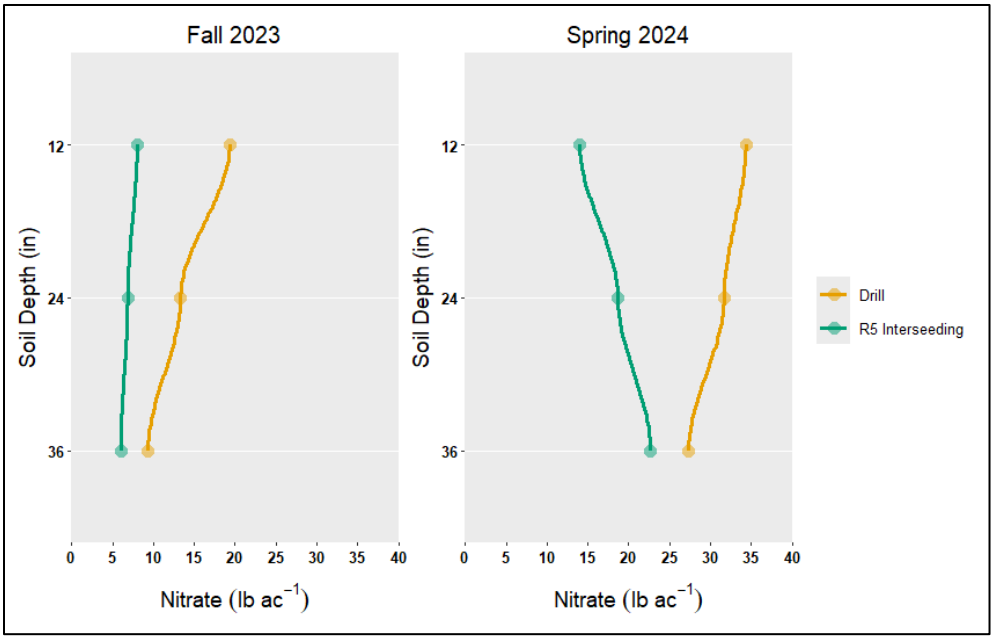



**Table 2.** Fall 2023 cover crops stand count and Spring 2024 aboveground cover crops biomass.

| | Fall 2023 | | Spring 2024 |
|---|---|---|---|
| | Stand Count (plants/sq ft) | Cover Crop Biomass (lb/ac) | Cover Crop Biomass (lb/ac) |
| Drill (Post Harvest) | 12 | - | 3178.0 B |
| Interseeded R5 | - | 3821.2 | 3887.4 A |
| P-Value | - | - | 0.011 |

*Values with different letter are significantly different at a 90% confidence level.

**Figure 2.** Comparison of cover crop biomass Spring 2024 in Year 1 Drill vs. Interseeded at R5 corn.

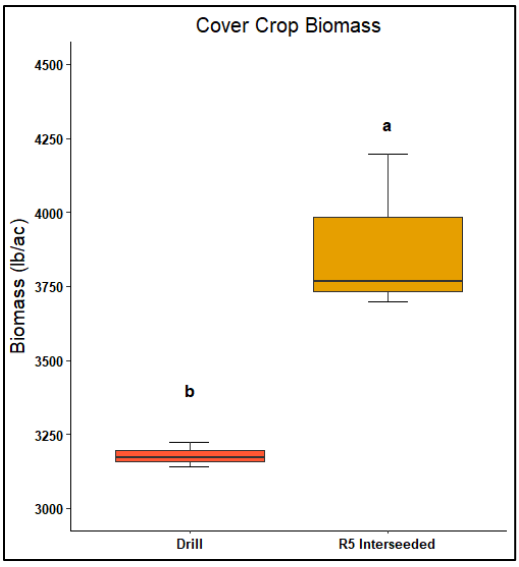



**Table 3.** 2024 soybean yield at drilled and R5 interseeded cover crop treatments.

**2024 Soybean Yield**

| | Yield (bu/ac)† |
|---|---|
| Drill (Post Harvest) | 87 A |
| Interseeded R5 | 88 A |
| P-Value | 0.828 |

†All results were not significantly different at 90% confidence level.

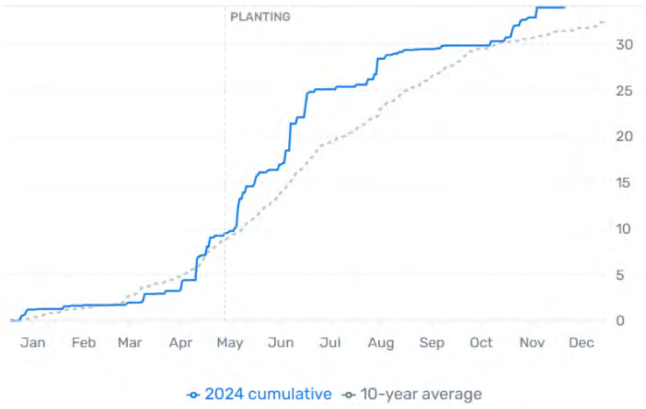
**Summary:**

- This corn field was chopped for silage on October 5, 2023, which helped early development of the cover crops.
- Soil nitrate levels increased from the fall to spring, which could have been due to the manure application during fall. This field was also grazed.
- Soil nitrate was significantly lower for depths 0-1' and 1-2' in the interseeded treatments when compared to the drilled treatments.
- At termination, total biomass was highest and statistically different for the interseeded treatments, when compared to the drilled treatments.
- There were no differences in yield between treatments.

# Highboy Cover Crop Interseeding Project Report – 1-Year Project

**Study ID:** 1543141202403
**County:** Butler
**Soil Type:** Ovina loamy fine sand
**Planting Date:** 5/12/24
**Harvest Date:** 10/19/24
**Seeding Rate:** 32,000
**Row Spacing (in):** 30”

**Hybrid:** Dekalb® DKC62-69, Wyffles® 6826
**Reps:** 3
**Previous Crop:** Corn
**Tillage:** Conventional
**Irrigation:** Yes, Pivot
**Rainfall (in):**


**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in the Fall and Spring each year. For years where the producer plants soybean in rotation, cover crops are established in the interseeded strips after soybean harvest.

In this field, a mix of cereal rye, turnip and rapeseed was interseeded at 70 lb/ac on September 5, 2023, at corn stage R5. With dry conditions at interseeding, 0.5” of irrigation was applied to aid cover crop establishment.

Soil samples for nitrates were taken on October 17, 2023 (Fall 2023) and on April 1, 2024 (Spring 2024) for each foot depth, up to 3 feet, on both treatments and three replications, Check (no cover crop) and Interseeded R5. Soil samples were analyzed for nitrate on each soil depth. Cover crop stand counts were assessed on October 17, 2023, and aboveground cover crop biomass was collected on April 2, 2024.

**Figure 1.** A visual comparison of soil nitrate levels in Fall 2023 vs. Spring 2024 in Check vs. Interseeded at R5 corn.

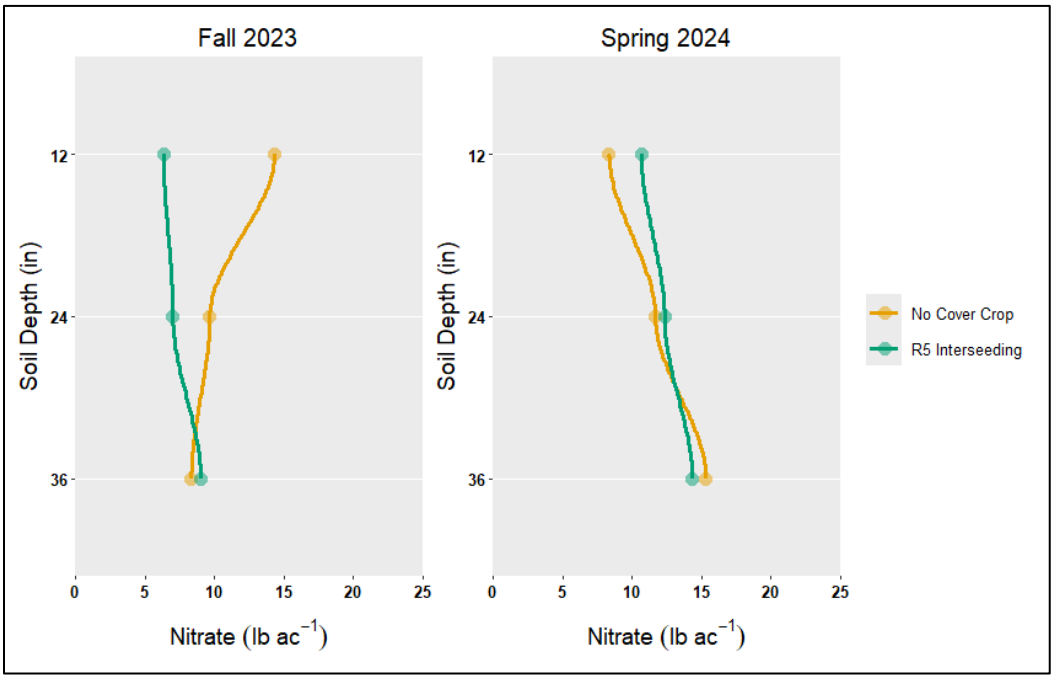



**Table 2.** Fall 2023 stand count and Spring 2024 aboveground cover crops biomass.

| | Fall 2023 | Spring 2024 |
|---|---|---|
| | Cover Crops stand Count (plants/sq ft) | Cover Crop Biomass (lb/ac) |
| Interseeded R5 | 30 | 3178.9 |

**Table 3.** 2024 corn yield at check and interseeded cover crop treatments.

| | 2024 Corn Yield (bu/ac)† |
|---|---|
| R5 Interseeded | 149 A |
| Check (No cover crop) | 154 A |
| P-Value | 0.610 |

†All results were not significantly different at 90% confidence level.

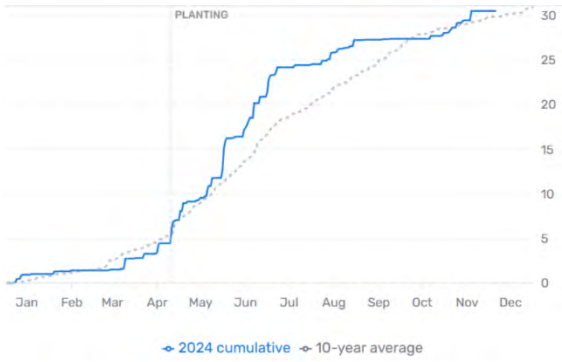
**Summary:**

- There were significant differences in soil nitrate between treatments at all depths in the Fall of 2023 and the Spring of 2024 soil sampling.
- Adequate cover crop growth was observed in the Fall of 2023 with 30 plants/square foot.
- At termination, total cover crops biomass was approximately 3178.9 lb/ac.
- No differences in yield were observed between treatments.

# Highboy Cover Crop Interseeding Project Report – 1-Year Project

**Study ID:** 1552141202401
**County:** Platte
**Soil Type:** Nora-Crofton complex, 6 to 11% slopes, eroded
**Planting Date:** 4/20/24
**Harvest Date:** 10/01/24
**Seeding Rate:** 35,000
**Row Spacing (in):** 30”
**Reps:** 3

**Previous Crop**: Corn
**Tillage:** No-Till
**Fertilizer:** 250 lb N/ac
**Irrigation:** Yes, Pivot
**Rainfall (in):**


**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in the Fall and Spring each year. For years where the producer plants soybean in rotation, cover crops are established in the interseeded strips after soybean harvest.

In this field, cereal rye was interseeded at 70 lb/ac on September 27, 2023, at corn stage R5. With dry conditions at interseeding, 0.5” of irrigation was applied to aid cover crop establishment.

Soil samples for nitrates were taken on November 1, 2023 (Fall 2023) and on March 21, 2024 (Spring 2024) fpr each foot depth, up to 3 feet, on both treatments and three replications, Check (no cover crop) and Interseeded R5. Soil samples were analyzed for nitrate on each soil depth. Aboveground cover crop biomass was collected on April 1, 2024.

**Figure 1.** A visual comparison of soil nitrate levels in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn.

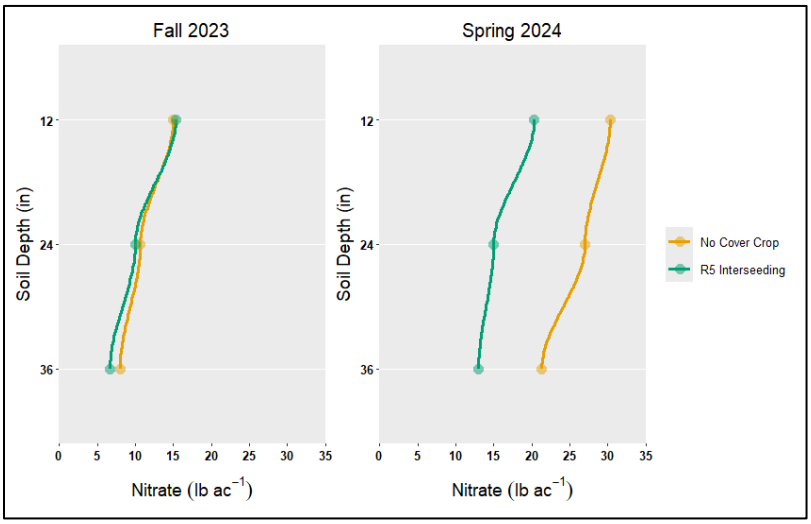



**Table 2.** Spring 2024 aboveground cover crops biomass.

| | Fall 2023 Cover Crop Biomass (lb/ac) | Spring 2024 Cover Crop Biomass (lb/ac) |
|---|---|---|
| Interseeded R5 | N/A | 694.6 |

**Table 3.** 2024 corn yield at check and interseeded cover crop treatments.

| | 2024 Corn Yield (bu/ac)† |
|---|---|
| R5 Interseeded | 227 A |
| Check (No cover crop) | 220 A |
| P-Value | 0.326 |

†All results were not significantly different at 90% confidence level.

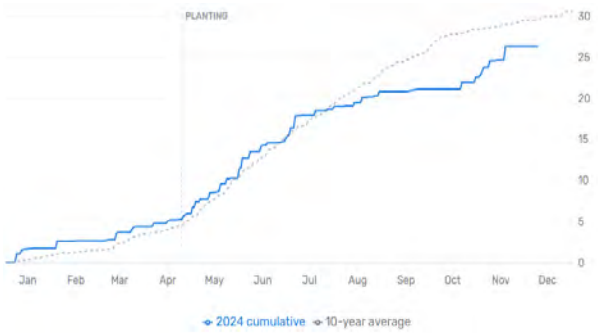
**Summary:**

- No cover crop growth was observed in the Fall of 2023. It could be attributed to the fact that this field was the last field interseeded, which could have affected germination and establishment.
- Cover crop biomass around 700 lb/ac was observed during the Spring of 2024. These numbers were lower when compared to other fields interseeded earlier (numbers around 4,000 to 6,500 lb/ac).
- Soil nitrate levels increased from the Fall to Spring on both treatments. However, lower soil nitrate levels were observed with the cover crop treatments, suggesting that cover crops can potentially use residual soil N during the off-season.
- There was no significant difference in yield between treatments.

# Highboy Cover Crop Interseeding Project Report – Year 1

**Study ID:** 1553185202401
**County:** York
**Soil Type:** Hastings silt loam
**Planting Date:** 5/11/24
**Harvest Date:** 10/13/24
**Row Spacing (in):** 30” corn
**Hybrid:** Channel® 216-82STX
**Reps:** 4 reps of interseeded cover crops
**Previous Crop:** Corn

**Tillage:** No-till
**Herbicides:** ***Burndown:*** Roundup PowerMAX® ***Early Post:*** Roundup PowerMAX® + Resicore® + atrazine ***Post:*** Roundup PowerMAX® + Laudis® + Status® + atrazine
**Fertilizer:** 11-52-0 VRT avg. 152#, 3 gal 5-20-5 starter, 235 lb N and 15 lb S
**Irrigation:** 7” pivot irrigated
**Rainfall (in):**


**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in the Fall and Spring each year. For years where the producer plants soybean in rotation, cover crops are established in the interseeded strips after soybean harvest. The studies will be conducted in the same field for 3 years. Year 1 began in the Fall of 2023.

In this field, a mix of cereal rye, turnip and rapeseed was interseeded at 70 lb/ac on September 19, 2023, at corn stage R5. With dry conditions at interseeding, 0.5” of irrigation was applied to aid in cover crop establishment.

Deep soil sampling for nitrates was taken on November 9, 2023 (Fall 2023) and on April 11, 2024 (Spring 2024) on each foot depth, up to 6 feet, on both treatments Check (no cover crop) and Interseeded R5, for four replications. Soil samples were analyzed for nitrate on each soil depth. A beginning soil health test was also taken November 9, 2023, at the 0-8" depth. Aboveground cover crop biomass was collected on the same day as soil sampling in the Fall of 2023. However, in the following spring, aboveground cover crop biomass was taken on April 10, the day before spring soil sampling. The grower was concerned about letting the rye grow too tall before planting corn.

**Figure 1:** Photos of the Highboy machine and cover crop emergence.

**Results:**

**Table 1.** Beginning Soil Health Assessment (0-8") taken on November 9, 2023.

| pH | OM LOI % | Soil Respiration $CO_2$-C ppm C | Total Nitrogen ppm N | Organic Nitrogen ppm N | Total Organic Carbon ppm C | Microbial Active Carbon (%) | Soil Health Calculation | Water Stable Aggregates (%) |
|---|---|---|---|---|---|---|---|---|
| 6.7 | 3.5 | 114.9 | 16.5 | 11.9 | 130 | 88.2 | 14.95 | 51 |

**Figure 1.** Comparison of soil nitrate levels in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn. There were no statistical differences between the treatments with fall soil sampling.

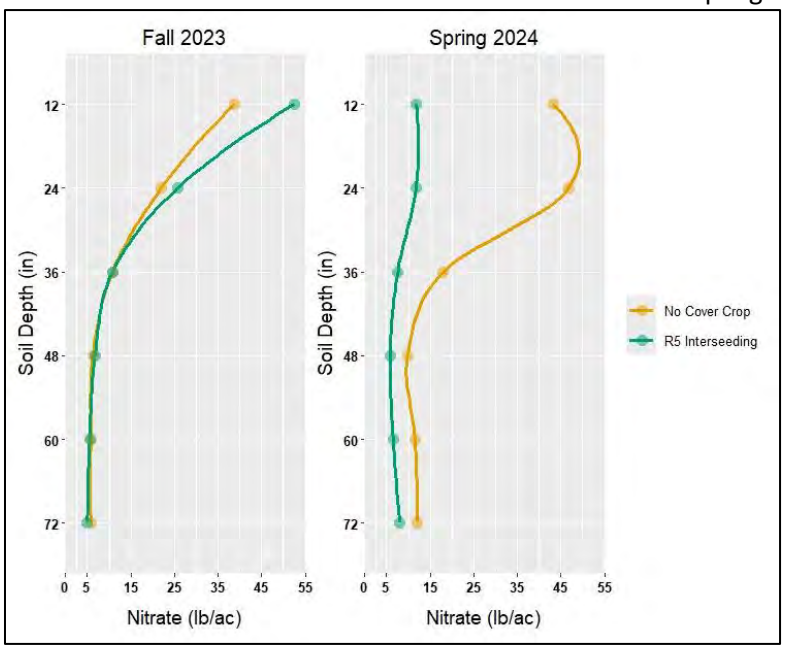


**Figure 2.** A visual comparison of cover crop biomass in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn. There was a significant increase in cover crop biomass in the Spring vs. the Fall Interseeded cover crop.

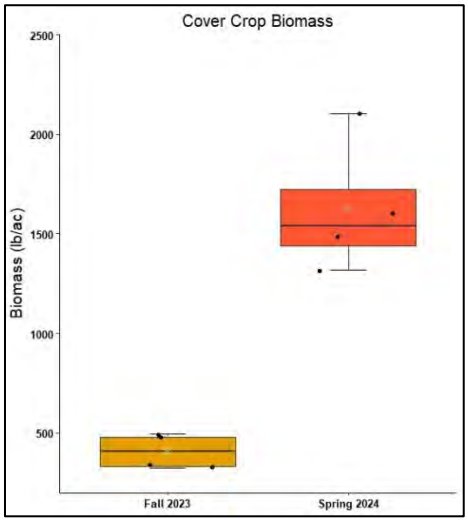
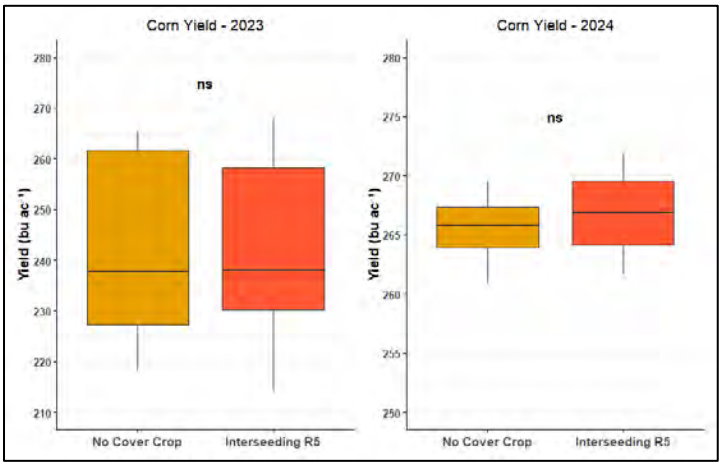



**Figure 3.** A visual comparison of Corn yield in 2023 and 2024 in Interseeded at R5 vs. Check (No cover crop) treatments. There was no corn yield differences with the addition of the Interseeded cover crop in the system in 2023 and 2024.




ns: non-significant differences in yield between treatments.

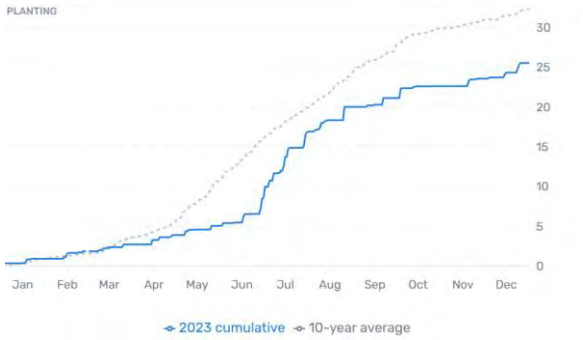
**Summary:**

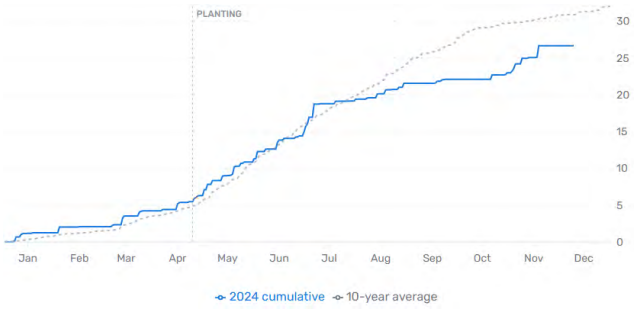
- There were no significant differences in soil nitrate levels between treatments on each soil depth in the fall of 2023.
- Significant differences between treatments were observed in soil nitrate levels at the 0-1' and 1-2' foot depths in the spring of 2024, with lower nitrate concentration observed for the Interseeded R5 treatment, compared with the Check (no cover crop).
- There were differences between Fall 2023 and Spring 2024 cover crop biomass sampling. At cover crop termination time, total biomass was approximately 1,625 lb/ac. No weeds were observed in any treatments in the fall or spring.
- There were no corn yield differences between the Check and Interseeded cover crops in Year 1.

# Highboy Cover Crop Interseeding Project Report – Year 1

**Study ID:** 1339187202401
**County:** Seward
**Soil Type:** Hastings silt loam
**Planting Date:** 5/16/24
**Harvest Date:** 9/26/24
**Seeding Rate:** 154,000 (122,125 final stand)
**Row Spacing (in):** 30” corn / 15” soybeans
**Variety:** Channel® 2524RXF
**Reps:** 3 reps of interseeded cover crops
**Previous Crop:** Corn

**Tillage:** No-Till
**Herbicides:** ***Pre:*** 4 oz Fierce® XLT + 10 oz Deonate® + 40 oz Roundup PowerMAX® 3 on 5/16/24 ***Post:*** 12.8 oz Engenia® + 10 oz Arrow® + 24 oz Roundup PowerMAX® 3
**Fertilizer:** None
**Irrigation:** Pivot, 5.5”
**Rainfall (in):**




**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in Fall and Spring each year. For years when the producer plants soybeans in rotation, cover crops are established in the interseeded strips after soybean harvest. The studies will be conducted in the same field for 3 years. Year 1 began in the Fall of 2023.

In this field, a mix of cereal rye, turnip and rapeseed was interseeded at 70 lb/ac on September 18, 2023. With dry conditions at interseeding, 0.5” of irrigation was applied to aid in cover crop establishment. This was the last irrigation of the season, as the field had been hail damaged and the corn matured quickly.

Deep soil samples for nitrates were taken on November 9, 2023 (Fall 2023) and on April 11, 2024 (Spring 2024) on each foot depth, up to 6 feet, on both treatments Check (no cover crop) and Interseeded R5, for three replications. Soil samples were analyzed for nitrate on each soil depth. A beginning soil health assessment was also collected on November 9, 2023. Aboveground cover crop biomass was collected on the same day as soil sampling in the Fall of 2023. Aboveground cover crop biomass in the spring was taken on May 9. Soybeans were planted green into the cereal rye on May 16 and the rye was terminated that day.

**Figure 1:** Photos of the highboy machine and cover crop germination.

**Results:**

**Table 1.** Beginning Soil Health Assessment (0-8") taken on November 9, 2023.

| pH | OM LOI (%) | Soil Resp. $CO_2$-C ppm C | Total Nitrogen ppm N | Organic Nitrogen ppm N | Total Organic Carbon ppm C | Microbial Active Carbon (%) | Soil Health Calculation | Water Stable Aggregates (%) |
|---|---|---|---|---|---|---|---|---|
| 6.3 | 3.3 | 113.5 | 14.7 | 12.5 | 142 | 79.8 | 15.15 | 37 |

**Table 2.** Year 1 Fall (Nov. 9, 2023) and Spring (April 11, 2024) soil nitrate samples (0-6') in Check vs. Interseeded at R5 corn.

| | Fall 2023† | | | | | | Spring 2024 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lbs N/A | | | | | | | | | | | |
| | 0-1' | 1-2' | 2-3' | 3-4' | 4-5' | 5-6' | 0-1' | 1-2' | 2-3' | 3-4' | 4-5' | 5-6' |
| Check | 14.7 | 10.7 | 7.7 | 6.0 | 6.3 | 7.3 | 13.7 A* | 8.0 A | 4.0 A | 3.0 A | 5.0 A | 6.0 A |
| Interseeded R5 | 20.0 | 14.7 | 9.0 | 5.3 | 4.7 | 6.0 | 6.7 B | 5.7 A | 3.0 A | 6.3 A | 7.0 A | 7.0 A |
| P-Value | 0.317 | 0.193 | 0.374 | 0.407 | 0.152 | 0.249 | 0.009 | 0.398 | 0.423 | 0.407 | 0.422 | 0.288 |

†All results were not significantly different at 95% confidence level.

*Values with the same letter are not significantly different at a 95% confidence level.

**Figure 2:** Comparison of soil nitrate levels in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn.

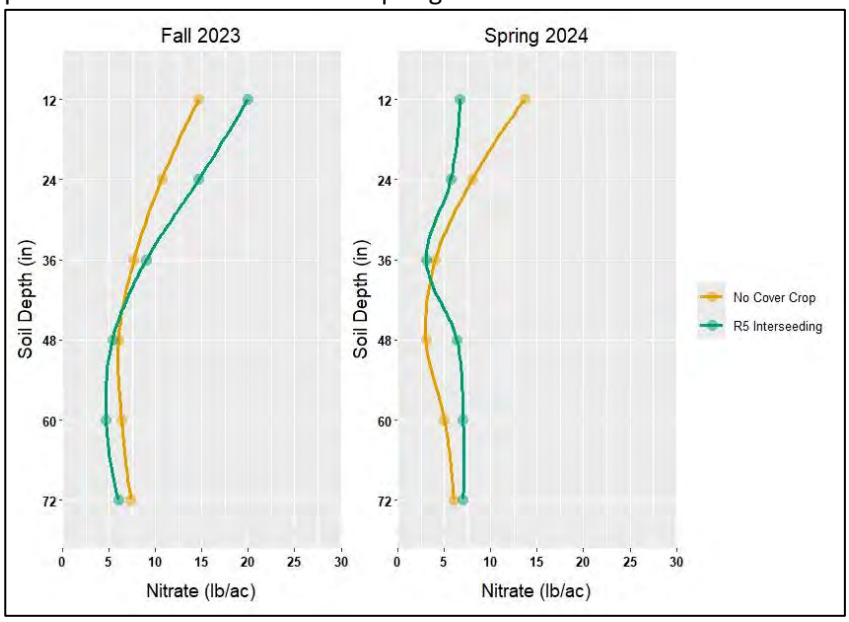



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**Table 3.**
Comparison of cover crop and weed biomass taken in the Fall 2023 vs. Spring 2024 in Check vs. Interseeded at R5 corn in Year 1.

| | Interseeded R5 | | Check |
|---|---|---|---|
| | Cover Crop Biomass (lb/ac) | Weed Biomass (lb/ac) | Weed Biomass (lb/ac) |
| Fall 2023 | 272.1 A* | 0 | 0 |
| Spring 2024 | 873.8 B | 0 | 0 |
| P-Value | 0.001 | - | - |

*Values with the same letter are not significantly different at a 95% confidence level.

**Figure 3:** A visual comparison of cover crop biomass in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn.

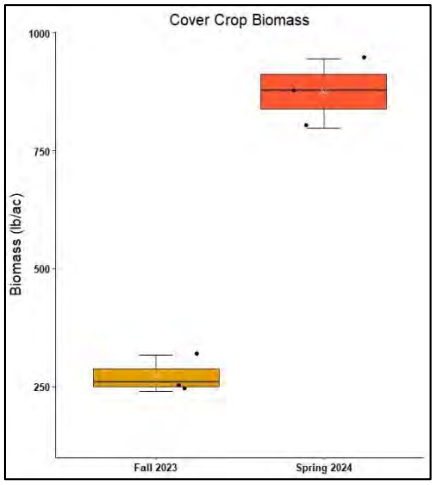
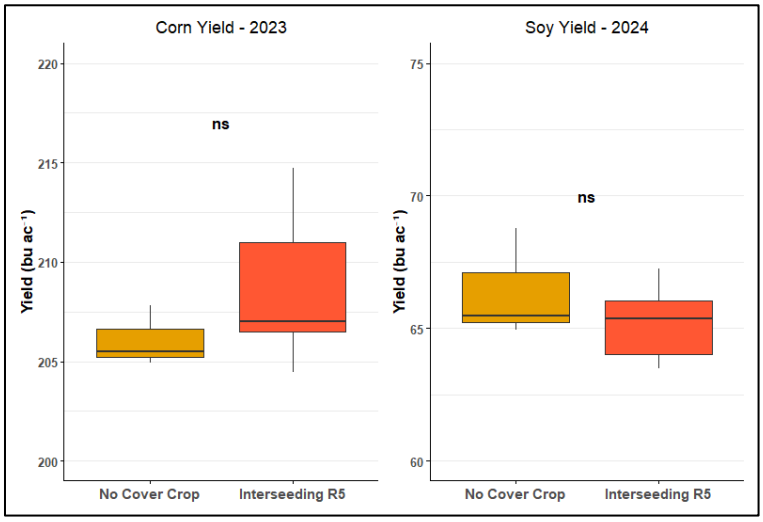


**Table 4.** Corn yield in 2023 and Soybean yield in 2024 in Interseeded at R5 vs Check (No cover crop) treatments.

| | 2023 Corn Yield (bu/ac)† | 2024 Soybean Yield (bu/ac)† |
|---|---|---|
| Interseeded R5 | 209 A* | 65 A |
| Check (No cover crop) | 206 B | 66 A |
| P-Value: | 0.055 | 0.352 |

*All results were not significantly different at 95% confidence level.

**Figure 4:** A visual comparison of Corn yield in 2023 and Soybean yield in 2024 in Interseeded at R5 vs Check.




**Summary:**

- There were no significant differences in soil nitrate levels between treatments on each soil depth in Fall 2023.
- Significant differences between treatments were observed in soil nitrate at the 0-1' foot depth in the Spring of 2024, with lower nitrate concentrations observed on Interseeded R5 treatment, compared with the Check (no cover crop). Moreover, there were no differences at the other depths. This indicates that cover crops can potentially use residual soil N during the off-season.
- Cover crop biomass showed differences between the Fall of 2023 and Spring of 2024 sampling, with 873.8 lb/ac of biomass present prior to termination. No weeds were observed in either treatment.
- The grower felt if he would have irrigated another pass in the Fall of 2023, he may have had better cover cover establishment with the dry fall. He also mentioned this was two years of corn on corn prior to the interseeding in the Fall of 2023. Being no-till with a lot of residue and broadcast interseeding of cover crops, patchy cover crop establishment was noted and he felt all of these factors contributed to less seed to soil establishment and cover crop biomass than what may have otherwise been experienced. The other family field in a corn/soy rotation where he added the extra 0.5" of irrigation in the Fall of 2023 had over 5000 lb/ac of cover crop biomass in the Spring of 2024.
- No differences in yield were found between treatments in either corn or soybeans.

# Highboy Cover Crop Interseeding Project Report – Year 1

**Study ID:** 1226187202401
**County:** Gage
**Soil Type:** Kennebec silt loam
**Planting Date:** 2024
**Harvest Date:** 2024
**Seeding Rate:** 150,000
**Row Spacing (in):** 15”
**Hybrid:** Asgrow® AG30XF4
**Reps:** 3 reps of each cover crop treatment
**Previous Crop:** Corn

**Tillage:** No-Till
**Herbicides:** 48 oz/ac Warrant® + 26 oz/ac Roundup PowerMAX® + 12 oz/ac Outlook® + 12 oz/ac Intensity® 36 oz/ac Liberty ® + 3 lb/ac AMS
**Fertilizer:** None
**Irrigation:** Yes, Pivot
**Rainfall (in):**



**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in the Fall and Spring each year. For years where the producer plants soybean in rotation, cover crops are established in the Interseeded strips after soybean harvest. The studies will be conducted in the same field for 3 years. Year 1 began in the Fall of 2023.

In this field, a mix of cereal rye, turnip and rapeseed was interseeded at 70 lb/ac on August 24, 2023, at corn stage R5. With dry conditions at interseeding, 0.5” of irrigation was applied to aid in cover crop establishment. Cereal rye was drilled at 50 lb/ac after corn harvest early November.

Deep soil samples for nitrates were taken on November 10, 2023 (Fall 2023) and on March 28, 2024 (Spring 2024) on each foot depth, up to 6 feet, on all treatments and four replications, Check (no cover crop), Interseeded R5 and Drill after harvest. Soil samples were analyzed for nitrate on each soil depth. Aboveground cover crop biomass was collected on same day as soil sampling in the Fall of 2023. However, the following spring, aboveground cover crop biomass was taken on May 8, 2024, prior to cover crop termination.

**Figure 1,2:** Cover crop biomass on drilled after harvest (left) and on interseeded R5 (right) collected on May 8, 2024.

**Results:**

**Figure 1.** A visual comparison of soil nitrate levels in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn vs. Drill after harvest.

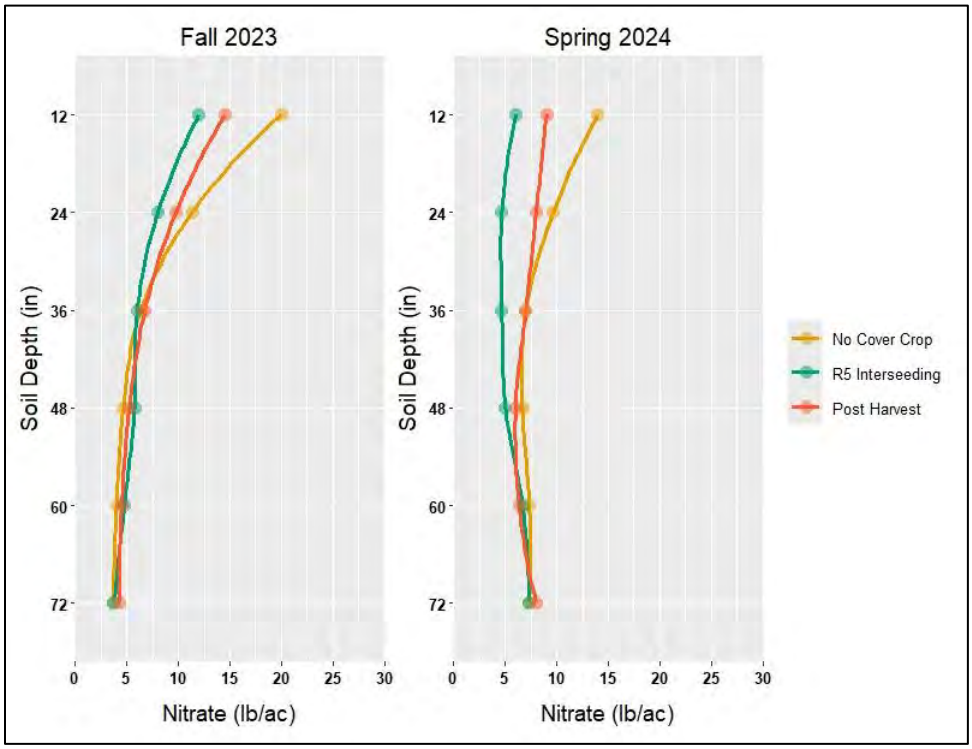


**Figure 2.** A visual comparison of cover crop biomass in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn vs. Drill after harvest.

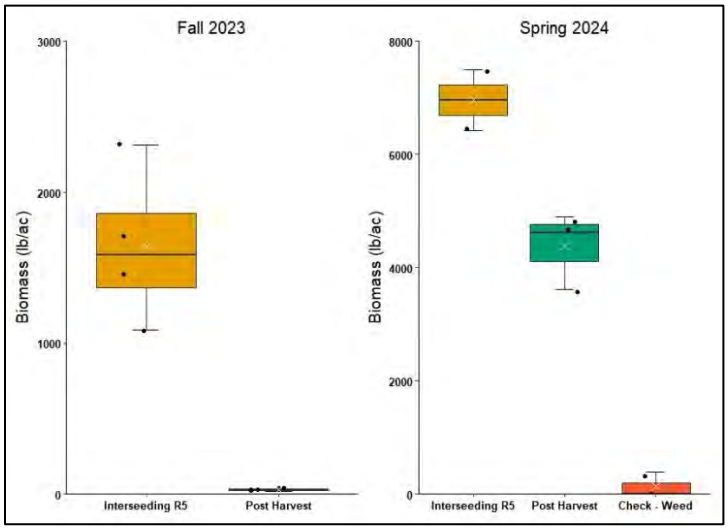
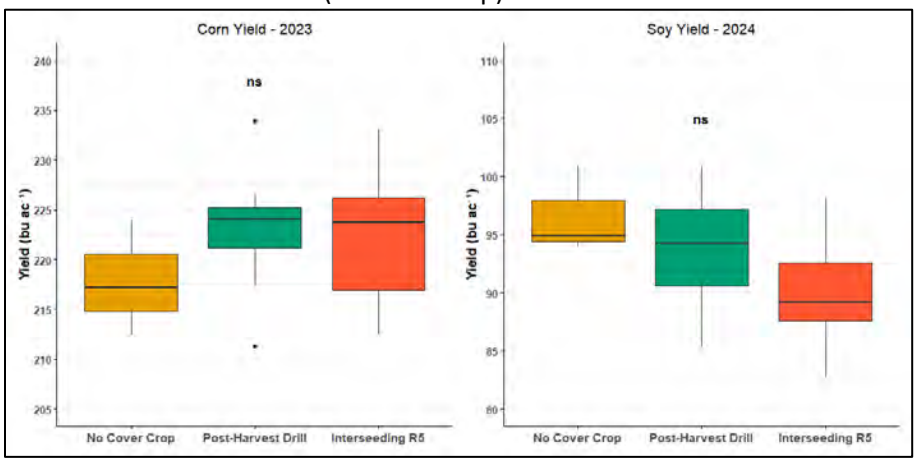



**Figure 3.** A visual comparison of corn yield in 2023 and soybean yield in 2024 in Interseeded at R5 vs Post Harvest Drill vs Check (no cover crop) treatments.




ns: non-significant differences in yield between treatments.

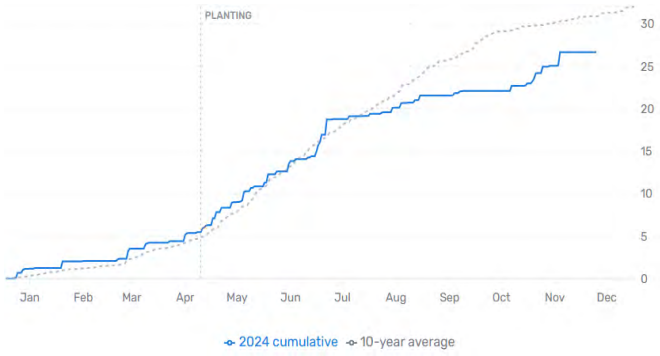
**Summary:**

- There were significant differences in soil nitrate between treatments in the first soil depth (0-1') in the fall of 2023.
- Significant differences between treatments were observed in soil nitrate at the 0-1' depth in spring of 2024, with lower nitrate concentration observed on Interseeded R5 treatment, compared with the Drill after harvest and Check (no cover crop). There was no difference at the 1-2' depth between Drill after harvest and Interseeded R5 or Check.
- Significant differences between Interseeded R5 and Drill on cover crop biomass were found in the Fall of 2023 and Spring of 2024.
- At cover crop termination time, total biomass was approximately 7,716 lb/ac on Interseeded R5 and approximately 4,377 lb/ac on Drill after harvest.
- No differences were found in yield between treatments in corn or soybeans.

# Highboy Cover Crop Interseeding Project Report – Year 1

**Study ID:** 1551187202401
**County:** Seward
**Soil Type:** Hastings silt loam
**Planting Date:** 5/11/24
**Harvest Date:** 9/28/24
**Seeding Rate:** 154,000 / 126,000 final stand
**Row Spacing (in):** 15”
**Variety:** Channel® 2922RXF
**Reps:** 3 reps of interseeded cover crops
**Previous Crop:** Corn

**Tillage:** No-till
**Herbicides:** ***Pre:*** 4 oz Fierce® XLT + 10 oz Detonate® + 40 oz Roundup PowerMAX® 3 on 5/11/24 ***Post:*** 12.8 oz Engenia® + 10 oz Arrow® + 24 oz Roundup PowerMAX® 3
**Fertilizer:** None
**Irrigation:** Pivot, 7.25”
**Rainfall (in):**


**Introduction:** For years where the producer plants soybean in rotation, cover crops are established in the interseeded strips after soybean harvest. The studies will be conducted in the same field for 3 years. Year 1 began in the Fall of 2023. In this field, a mix of cereal rye, turnip and rapeseed was interseeded at 70 lb/ac on September 18, 2023, at corn stage R5. With dry conditions at interseeding, two passes of 0.5” of irrigation were applied to aid in cover crop establishment. Soil samples for nitrates were taken on November 1, 2023 (Fall 2023) and on March 19, 2024 (Spring 2024) on each foot depth, up to 3 feet, on both treatments Check (no cover crop) and Interseeded R5, and three replications. Soil samples were analyzed for nitrate on each soil depth. A soil health assessment (0-8") was also taken on November 1, 2023. No cover crop biomass was taken in the Fall of 2023 due to minimal growth. In the Spring of 2024, aboveground cover crop biomass was taken on May 9, resulting in total biomass average of 5666.9 lb/ac. The biomass in the field was over 2.5 feet tall average. Soybeans were planted green into the rye on 5/16/24 and the rye was terminated the same day.

**Figure 1**: The difference between the cover crop in the wheel track (left photo) vs. the rest of field (right) on November 1, 2023.

**Results:**

**Table 1.** Beginning Soil Health Assessment (0-8") taken on November 1, 2023.

| pH | OM LOI % | Soil Respiration $CO_2$-C ppm C | Total Nitrogen ppm N | Organic Nitrogen ppm N | Total Organic Carbon ppm C | Microbial Active Carbon (%) | Soil Health Calculation | Water Stable Aggregates (%) |
|---|---|---|---|---|---|---|---|---|
| 5.7 | 3.6 | 77.5 | 15.3 | 12.3 | 126 | 61.5 | 11.86 | 46 |

**Figure 1.** A visual comparison of soil nitrate levels in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn. There were no differences in nitrate for any of the treatments at any soil depth.

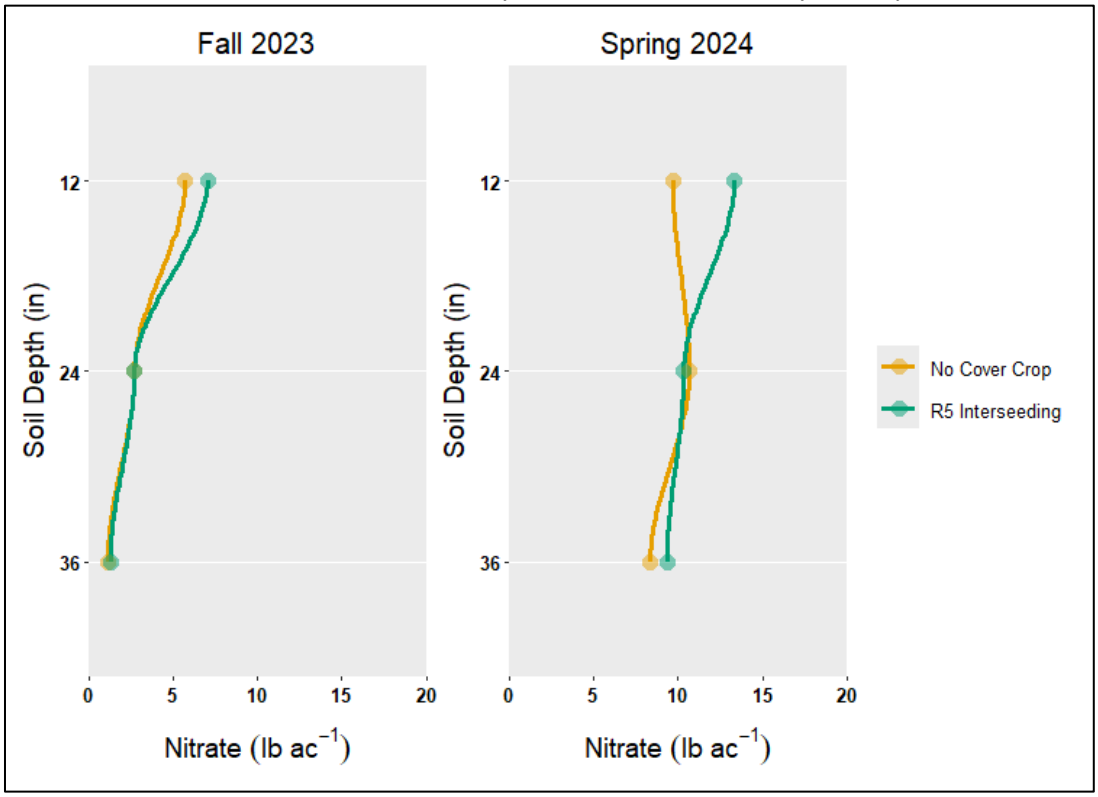
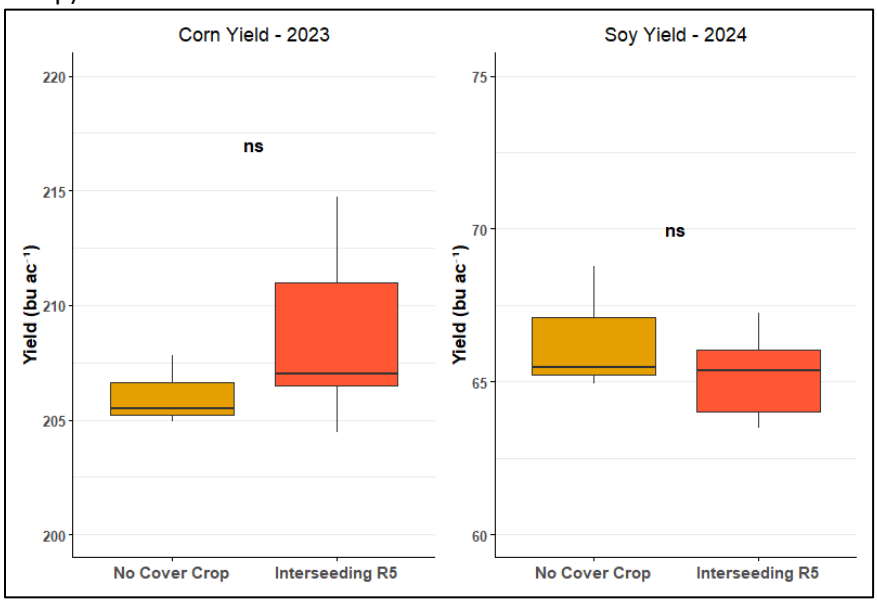


**Figure 2.** A visual comparison of Corn yield in 2023 and Soybean yield in 2024 in Interseeded at R5 vs Check (No cover crop) treatments.




ns: non-significant differences in yield between treatments.

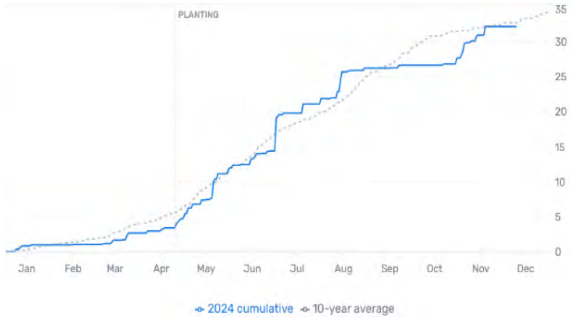
**Summary:**

- There were no significant differences in soil nitrate between treatments at each soil depth in the Fall of 2023 and Spring of 2024.
- Cover crop biomass measured in the Spring 2024 was estimated at 5666.9 lb/ac of biomass prior to termination. No substantial cover crop biomass was observed in the Fall of 2023. Applying 1" of irrigation the Fall of 2023 in a dry fall may have helped for better germination and establishment going into the Spring of 2024.
- No weeds were observed on both dates of collection in either treatment.
- There were no differences in corn or soybean yields between the treatments in year 1.

# Highboy Cover Crop Interseeding Project Report – Year 1

**Study ID:** 1549067202401
**County:** Saunders
**Planting Date:** 2024
**Harvest Date:** 2024
**Row Spacing (in):** 30” corn

**Reps:** 3 reps of interseeded cover crops
**Tillage:** No-till
**Irrigation:** Yes
**Rainfall (in):**


**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in the Fall and Spring each year. For years where the producer plants soybean in rotation, cover crops are drilled in the Interseeded strips after soybean harvest. The studies will be conducted in the same field for 3 years. Year 1 began in the Fall of 2023.

In this field, cereal rye was interseeded at 70 lb/ac on September 18, 2023, at corn stage R5. With dry conditions at interseeding, 0.5” of irrigation was applied to aid in cover crop establishment.

Deep soil samples for nitrates were taken on November 11, 2023 (Fall 2023) and on April 12, 2024 (Spring 2024) on each foot depth, up to 6 feet, on both treatments and three replications, Check (no cover crop) and Interseeded R5. Soil samples were analyzed for Nitrate on each soil depth. Aboveground cover crop biomass was collected on same day as soil sampling on Fall 2023. On Spring 2024, biomass was collected few days prior termination.

**Figure 1**: Photos: Cover crop fall sampling on Nov. 7, 2023 (left), Cover crop biomass when it was collected on April 12, 2024 (right).

## Results:

**Figure 2:** A visual comparison of soil nitrate levels in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn.

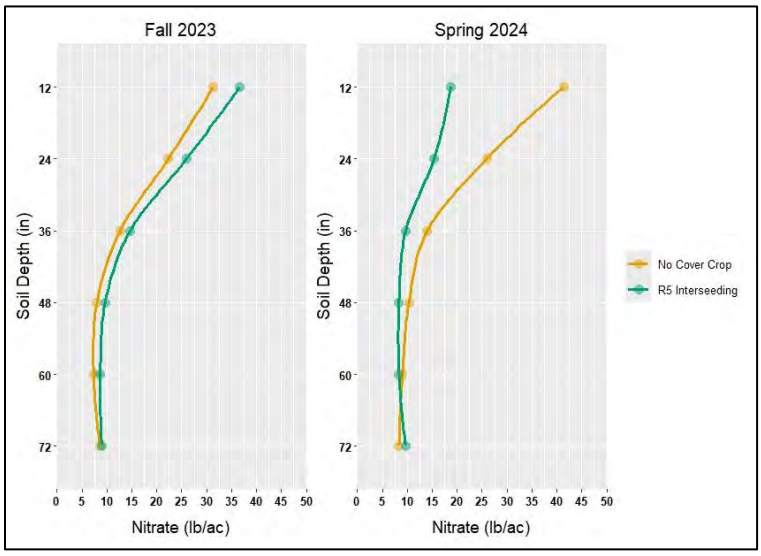
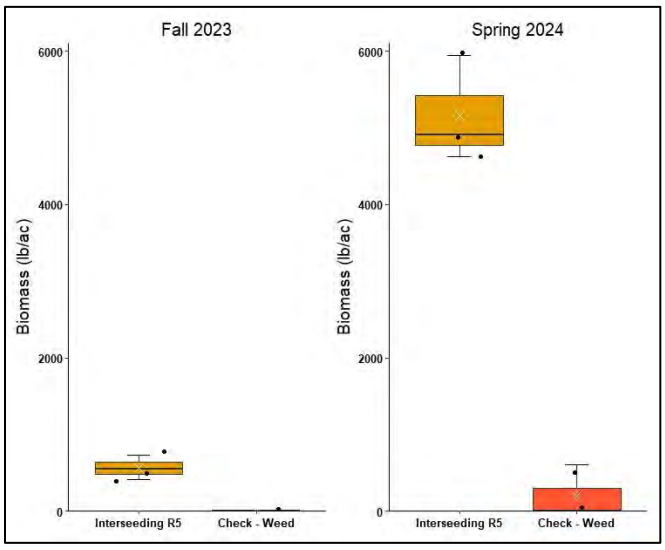



**Figure 3:** Comparison of cover crop and weed biomass in Spring vs. Fall in Year 1 Check vs. Interseeded at R5 corn.




## Summary:

- There were no significant differences in soil nitrate levels among treatments on each soil depth in the Fall of 2023.
- There were significant differences between treatments observed in soil nitrate at the 0-1’ and 1-2’ foot depths in the Spring of 2024, with lower nitrate concentrations observed on Interseeded R5 treatment, compared with the Check (no cover crop). This indicates that cover crops can potentially use residual soil N during the off-season.
- There were differences between Fall 2023 and Spring 2024 sampling for cover crop biomass. At cover crop termination time, total biomass was approximately 5,160 lb/ac.
- In the Spring of 2024, henbit was found in the check strips with no cover crop at 201 lb/ac.

# Highboy Cover Crop Interseeding Project Report – 1-Year Project

**Study ID:** 0210037202401
**County:** Colfax
**Planting Date:** 4/27/24
**Harvest Date:** 10/25/24
**Seeding Rate:** 33,000
**Row Spacing:** 30”
**Hybrid:** Golden Harvest® G15J91-V
**Reps**: 3
**Rainfall (in):**

**Previous Crop**: Soybean
**Tillage**: No-Till
**Herbicides:** ***Pre:*** 40 oz/ac Roundup PowerMAX® + 10 oz/ac 2,4-D + 2.5 qt/ac Acuron® ***Post:*** 3.6 pt/ac Halex® GT + 3 oz/ac (dry) Status®
**Fungicide:** 13.7 oz/ac Trivapro®
**Foliar and Soil Insecticides:** 8 oz/ac Force®
**Fertilizer:** 40 lb N/ac (at planting), 150 lb N/ac (sidedress), 30 lb N/ac (fertigation)



**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in the Fall and Spring each year. For years where the producer plants soybean in rotation, cover crops are established in the interseeded strips after soybean harvest.

In this field, cereal rye was interseeded at 70 lb/ac on September 7, 2023, at corn stage R5. With dry conditions at interseeding, 0.5” of irrigation was applied to aid cover crop establishment.

Soil samples for nitrates were taken on October 16, 2023 (Fall 2023) and on March 21, 2024 (Spring 2024) for each foot depth, up to 3 feet, on both treatments and three replications, Check (no cover crop) and Interseeded R5. Soil samples were analyzed for nitrate on each soil depth. Cover crop stand count was assessed on October 16$^{th}$, 2023, and aboveground cover crop biomass was collected on March 18, 2024.

**Figure 1.** Comparison of soil nitrate levels in Fall 2023 vs. Spring 2024 in Check vs. Interseeded at R5 corn.

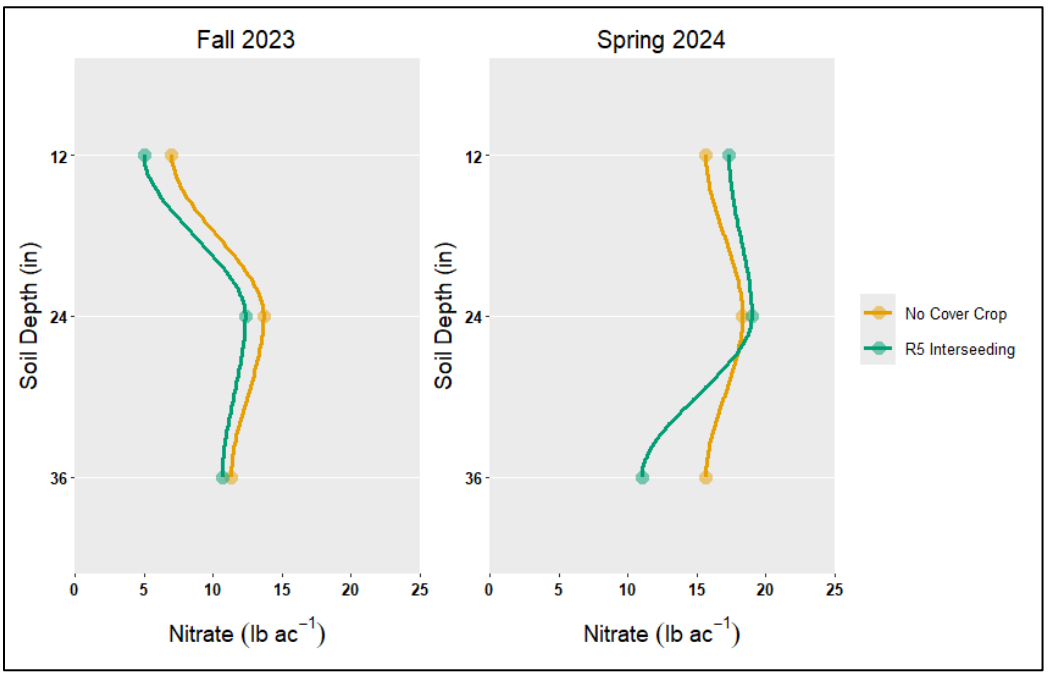



**Table 2.** Fall 2023 stand count and Spring 2024 aboveground cover crops biomass.

| | Fall 2023 | Spring 2024 |
|---|---|---|
| | Cover Crop Stand Count (plants/sq ft) | Cover Crop Biomass (lb/ac) |
| Interseeded R5 | 13 | 1971.9 |

**Table 3.** 2024 soybean yield at check and interseeded cover crop treatments.

| | 2024 Soybean Yield (bu/ac)† |
|---|---|
| R5 Interseeded | 68 A |
| Check (No cover crop) | 68 A |
| P-Value | 0.977 |

†All results were not significantly different at 90% confidence level.

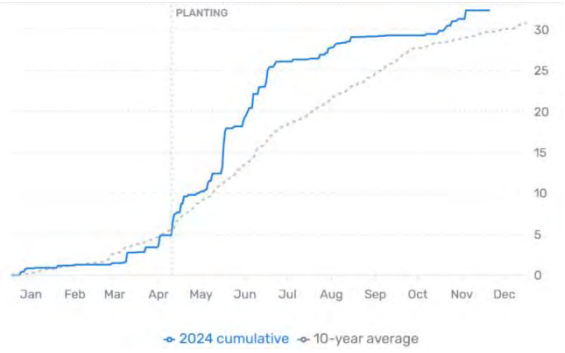
**Summary:**

- No significant differences were observed between nitrate soil samples at depths 0-1', 1-2', or 2-3' between the interseeded R5 cover crops and the non-interseeded checks.
- No significant differences were observed in soybean yield between the R5 Interseeded and the non-interseeded checks.

# Highboy Cover Crop Interseeding Project Report – 1 Year Project

**Study ID:** 1550141202402
**County:** Platte
**Soil Type:** Belfore silty clay loam, 0 to 2 percent slopes
**Planting Date:** 4/25/24
**Harvest Date:** 10/07/24
**Seeding Rate:** 135,000
**Row Spacing (in):** 30”
**Herbicides: PRE** 6 oz/ac Fierce® EZ + 32 oz/ac Roundup® applied 4/22/24; **Post** 22 oz/ac Xtendimax® + 8 oz Section® III + 32 oz/ac Roundup PowerMAX® applied 6/7/24.

**Hybrid:** Asgrow® AG30XF4
**Reps:** 3 reps of interseeded cover crops
**Previous Crop:** Corn
**Tillage:** No-till
**Fertilizer:** 30 t/ac cow manure in 2020
**Irrigation:** Yes
**Rainfall (in):**

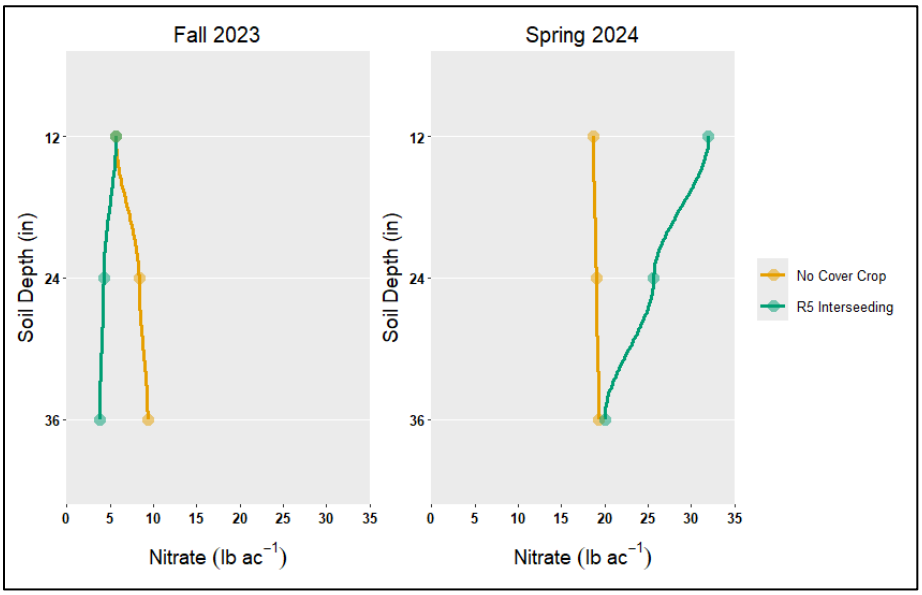




**Introduction:** The Highboy Cover Crop Interseeding Project (HiCCIP) aims to demonstrate interseeding cover crops late in the season at corn stage R5 utilizing a high clearance machine. The project's goal is to determine cover crop biomass production utilizing this seeding timing and to compare soil nitrate levels in Check vs. Interseeded treatments in the Fall and Spring each year. For years where the producer plants soybean in rotation, cover crops are established in the interseeded strips after soybean harvest.

In this field, cereal rye was interseeded at 70 lb/ac on August 29, 2023, at corn stage R5. With dry conditions at interseeding timing, 0.5” of irrigation was applied to aid in cover crop establishment.

Soil samples for nitrates were taken on October 15 2023 (Fall 2023) and on March 21, 2024 (Spring 2024) for each foot depth, up to 3 feet, on both treatments and three replications, Check (no cover crop) and Interseeded R5. Soil samples were analyzed for nitrate on each soil depth. Cover crop stand counts were assessed on October 15, 2023, and aboveground cover crop biomass was collected on April 1, 2024.

**Figure 1**: Comparison of soil nitrate levels in Fall 2023 vs. Spring 2024 in Check vs. Interseeded at R5 corn.



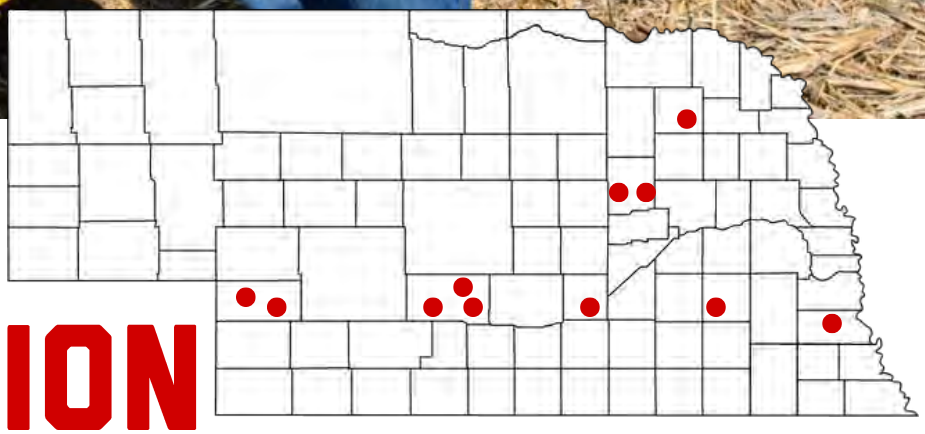

| | 2024 Soybean Yield (bu/ac)† |
|---|---|
| R5 Interseeded | 88 A |
| Check (No cover crop) | 86 A |
| P-Value: | 0.264 |

†All results were not significantly different at 90% confidence level.

**Table 1:** 2024 soybean yield with interseeded cover crops against untreated check.

**Summary:**

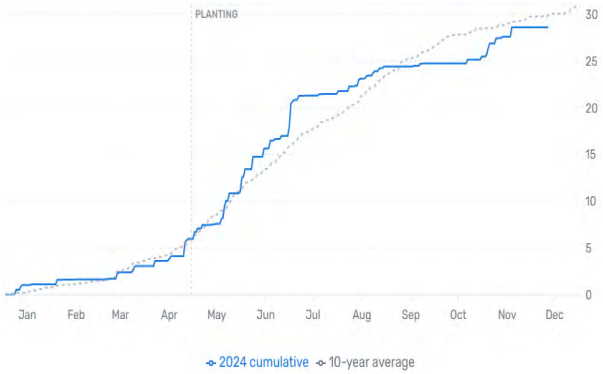
- Although some cover crop plants were observed during the Fall of 2023, no cover crop plants were found in the Spring of 2024. Cover crops stand count in the Fall 2023 was 0.31 plants/ft$^2$.
- Soil nitrate levels increased from the Fall to Spring on both treatments. The grower did not apply anything during this period, and the increase could have been a result of soil mineralization.
- More investigations are needed to explain why soil nitrate levels increased during the offseason.
- No differences in yield were found between treatments in 2024.



# CROP PROTECTION

# SaniDate® 12.0 for Suppression of White Mold in Soybeans

**Study ID:** 1542159202501
**County:** Seward
**Soil Type:** Hastings silt loam
**Planting Date:** 4/29/24
**Population:** 157,000
**Row Spacing (in):** 15”
**Hybrid:** Pioneer™ P30A75
**Reps:** 3
**Previous Crop:** Seed Corn
**Tillage:** Vertical-Till
**Herbicides:** ***Pre:*** 11 oz/ac Outlook® + 1 qt/ac Enlist One ® + 4.5 oz/ac Anthem Maxx® ***Post:*** 1 qt/ac Liberty® + 11 oz/ac Outlook® +1 qt/ac Enlist One ® + 10 oz/ac clethodim
**Seed Treatment:** Full Seed Treatment® + ILEVO®
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** None
**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:**

Soybean white mold (a.k.a. Sclerotinia stem rot) is a fungal pathogen of soybean production in the Northern United States. This disease spreads as spores from mushroom-like structures growing from fungal survival structures in and on the soil surface during wet or humid summer conditions. These can also be triggered to grow if excess water is added through overhead center pivot irrigation. SaniDate® 12.0, produced by BioSafe Systems, can kill bacteria and fungi through an oxidation chemical reaction. SaniDate®12.0 has been shown to be effective on other plant pathogens, especially bacterial pathogens, so it was applied here to test its effectiveness against the white mold pathogen. This product was applied three times with three irrigation events, starting at flowering in a production soybean field. The applications were made as irrigation was needed on July 9, July 29, and August 7. The field was scouted for disease pressure throughout the season and no white mold, or other significant disease was present.

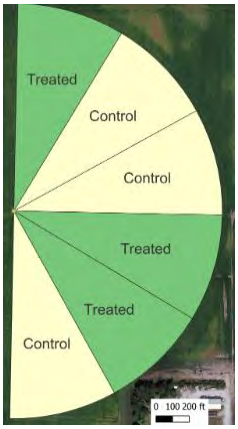



**Figure 1:** Project Design and treatment layout

**Results:**

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Untreated Check | 9.8 A* | 75 A | 822 A |
| SaniDate® 12.0 | 9.3 A | 76 A | 744 B |
| P-Value: | 0.24 | 0.58 | 0.06 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, BioSafe Sanidate® 12.0 cost of $30.32/ac/treatment.

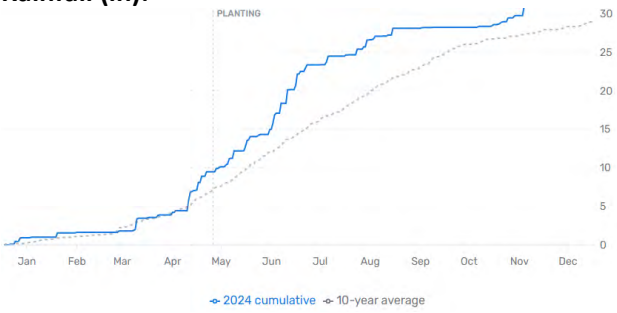
**Summary:**

- There was no significant difference found in yield between the untreated check and the BioSafe SaniDate® 12.0 treatment.
- There was a significant difference found in marginal net return, with the untreated check resulting in a $78/ac greater marginal net return.
- While we saw no significant direct return from the product, this may have been due to the low disease pressure in the field.

# Evaluation of Xyway® LFR on Top of Furrow Application In Corn

**Study ID:** 1541011202401
**County:** Boone
**Soil Type:** Hall silt loam 0-1% slope
**Planting Date:** 5/10/24
**Harvest Date:** 10/09/24
**Population:** 34,000
**Row Spacing (in):** 30”
**Hybrid:** Pioneer™ P14830Q
**Reps:** 11
**Previous Crop:** Soybean
**Tillage:** No-till
**Herbicides:** ***Pre:*** 16 oz/ac AAtrex® 4L + 40 oz/ac Resicore® + 32 oz/ac Glyplex® + 12 oz/ac Defy® + 2,4-D LV6 ***Post:*** 16 oz/ac AAtrex 4L® + 40 oz/ac Resicore® + 32 oz/ac Glyplex™5 extra
**Foliar Insecticides:** 1.6 oz/ac Bifenture® 2EC on 5/15/24
**Foliar Fungicides:** 6 oz/ac Aproach® Prima applied through center pivot on 8/11/24

**Fertilizer**: Pell lime, 11-52-0, and 0-0-60 variable rate applied in March; 32-0-0/thiosulfate 95/5 blend at 10 g/ac applied on 5/25/24; 32-0-0/thiosulfate 90/10 blend at 10g/ac applied on 6/10, 7/15, /7/27, 8/1, and 8/23/24. Utrisha, 5 oz/ac on 6/20/24
**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** This study evaluated the impact of Xyway® LFR® fungicide on corn yield when applied at planting on top of the furrow. Xyway® LFR® contains the active ingredient flutriafol and was applied at a rate of 8 oz/ac. The grower’s goal is to see if applying Xyway® LFR® at planting can help avoid in-season aerial application. Xyway® LFR® was compared with untreated plots in a randomized complete block design and was replicated 11 times.

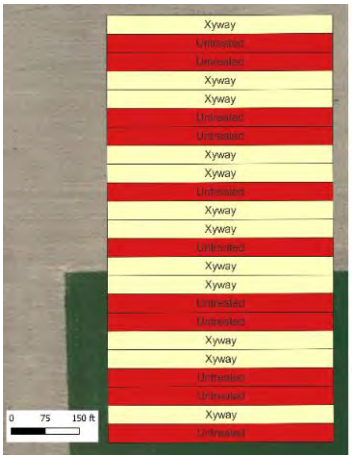



**Figure 1:** Project Design and Treatment Layout

**Results:**

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Check | 21.6 A* | 238 A | 1,035 A |
| Xyway®LFR® | 21.7 A | 240 A | 1,033 A |
| P-Value: | 0.47 | 0.33 | 0.72 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture
‡Marginal net return based on $4.35/bu corn, Xyway® cost $10.16/ac.

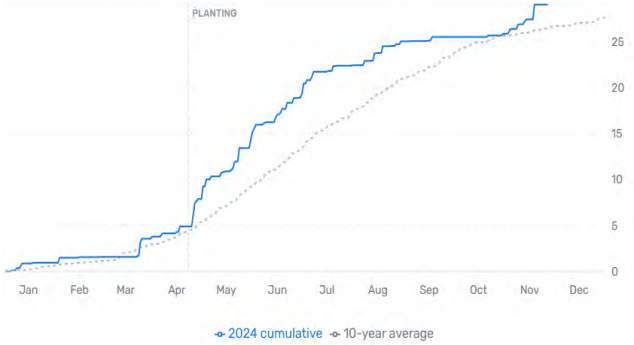
**Summary:**

- There was no significant difference in corn yield when applying Xyway® fungicide (238 bu/ac) against the untreated check (240 bu/ac).
- There was also no significant difference in marginal net return between the Xyway® application ($1,033/ac) and the untreated check ($1,035/ac).
- Disease pressure during the growing season can affect fungicide return on investment.

# Test of Zironar® in Irrigated Soybean

**Study ID:** 1531011202401
**County:** Boone
**Soil Type:** Nora silt loam
**Planting Date:** 4/22/24
**Harvest Date:** 9/28/24
**Population:** 130,000
**Row Spacing (in):** 20”
**Variety:** Pioneer® P25A16E
**Reps:** 5
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 10 oz/ac Barrage® + 6 oz/ac Fierce EZ® + 8 oz/ac glyphosate + 3.2 lb/ac AMS ***Post:*** 32 oz/ac Enlist One® + 43 oz/ac Liberty® + 8 oz/ac Outlook® + 4 oz/ac X-Cyte™ + 3.2 lb/ac AMS; 11.98 oz/ac clethodim

**Foliar Insecticides:** 3.98 oz/ac bifenthrin
**Foliar Fungicides:** 12 oz/ac Miravis Neo® + 9.5 oz/ac Preference® NIS
**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** Soybean cyst nematode is the number one yield-limiting pathogen of soybeans in the United States. This study evaluated the impact of Zironar® biofungicide/bionematicide on yield loss to soybean cyst nematode. Zironar® contains two *Bacillus* bacteria strains. Zironar® was applied in-furrow at 6 oz/ac at planting on April 22.

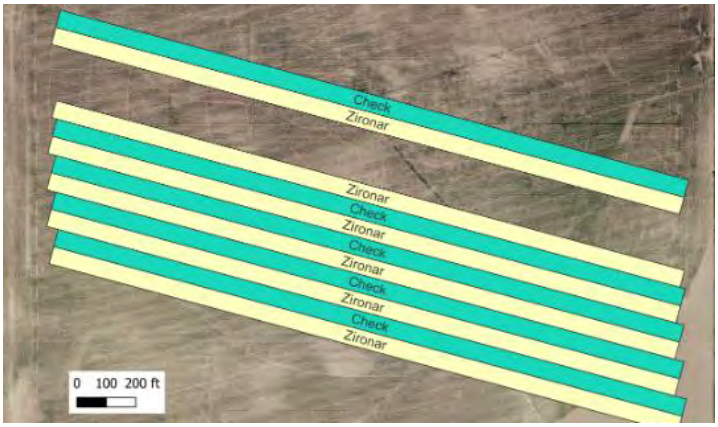



**Figure 1:** Project layout and design

**Results:**

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Check | 12.5 A* | 88 A | 967 A |
| Zironar® (6oz/ac) | 12.8 A | 90 A | 987 A |
| P-Value | 0.4 | 0.4 | 0.32 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, $6.50/ac for Zironar®.

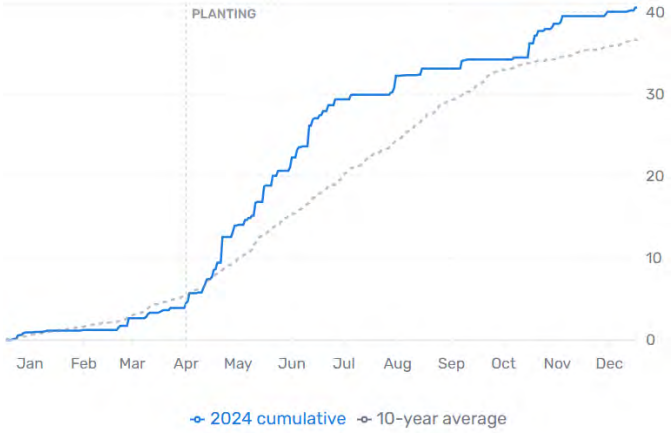
**Summary:**

- There were no significant differences in moisture, yield, or marginal net return among the treatments evaluated.
- Zironar® may be more effective in protecting yield in fields with high SCN pressure.

# Delaro® 325 Fungicide in Corn

**Study ID:** 1544131202501
**County:** Otoe
**Soil Type:** Ida silt loam 9-14% slopes; Monona silt loam 5-9% slopes
**Planting Date:** 4/15/24
**Population:** 32,000
**Row Spacing (in):** 20”
**Hybrid:** DEKALB® DKC68-48SS
**Reps:** 3
**Previous Crop:** Soybean
**Tillage:** No-till
**Herbicides:** ***Pre:*** 1.8 qt/ac Harness Xtra® + 12 oz/ac 2,4-D LC® + 20 oz/ac Roundup PowerMAX® 3 + 20 oz/ac Class Act® + 8 oz/ac Superb® HC + 2 oz/ac Balance Flexx® ***Post:*** 3 oz/ac Laudis® + 16 oz/ac Atrazine 4L® + 24 oz/ac Roundup PowerMAX® 3 + 24 oz/ac Class Act® NG® + 1 lb/ac AMS + 8 oz/ac Superb® HC + 2 oz/ac Interlock®
**Seed Treatment:** Standard

**Foliar Insecticides:** None
**Foliar Fungicides:** Varied
**Fertilizer:** 230 lb N/ac applied fall 2023. 219 lb/ac 11-52-0 and 356 lb/ac 0-0-60
**Irrigation:** None
**Rainfall (in):**




**Introduction:** Delaro® 325 contains two active ingredients- prothioconazole (group 3) + trifloxystrobin (group 11) to provide long-lasting residual disease control in corn and soybeans. The purpose of this study was to determine the efficacy of applying Delaro® 325 against an untreated check. Delaro® 325 + application costs were factored into the total cost of the product.

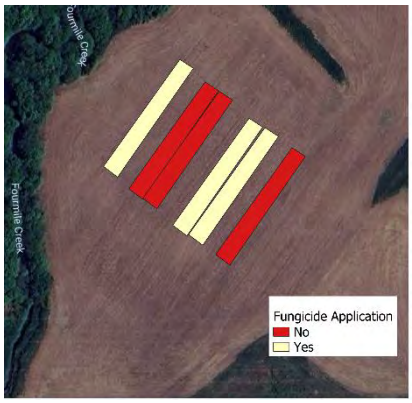



**Figure 1:** Project Design and Treatment Layout

**Results:**

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Delaro® 325 | 14.0 A* | 200 A | 840 A |
| Untreated Check | 14.0 A | 195 A | 847 A |
| P-Value: | 0.88 | 0.25 | 0.69 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $4.35/bu soybeans, $31/ac cost for Delaro® 325 + application fee.

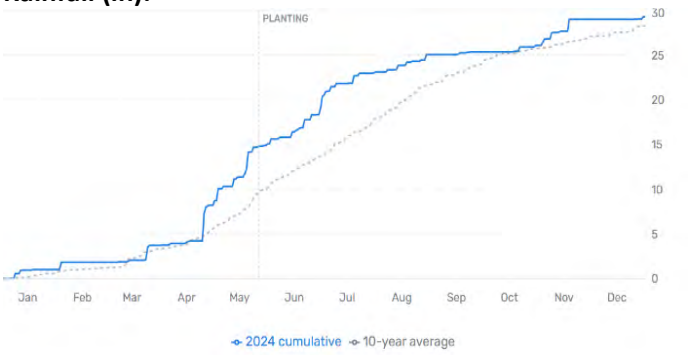
**Summary:**

- There were no significant differences in moisture, yield, or marginal net return between Delaro® 325 application and the untreated check.
- Fungicide selection and application may depend on a field’s history of pressure and current conditions.

# Xyway® LFR Fungicide Application to Soybeans

**Study ID:** 1212079202401
**County:** Hall
**Soil Type:** Ovina fine sandy loam; Ortello fine sandy loam
**Planting Date:** 5/26/24
**Harvest Date:** 10/4/24
**Population:** 160,000
**Row Spacing (in):** 36”
**Variety:** Connect™ CT2923E
**Reps:** 8
**Previous Crop:** Corn
**Tillage:** Cultivated 6/25/24, hilled 7/2/24
**Herbicides:** ***Pre:*** 22 oz/ac Broadax®
***Post:*** 2 pt/ac Enlist One® + 20 oz/ac Roundup PowerMAX® 3 + 12 oz/ac Outlook® applied 6/6/24. 1 qt/ac Liberty® + 1 qt/ac Warrant® applied 7/3/24
**Seed Treatment:** Acceleron® Fungicide + Insecticide, ILEVO®, and inoculant

**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** 13 gal/ac 8-20-5-5 + Zn applied in 2x2 band at planting
**Irrigation:** Pivot, Total: 7.75”
**Rainfall (in):**




**Introduction:** Xyway® LFR® (flutriafol) is a long-lasting disease control fungicide designed to be applied at planting. This product is designed to prevent foliar diseases that can reduce yield, but also invigorate plant physiological traits, such as leaf expansion. The goal of this study was to determine the effects of applying Xyway® LFR® at 11 oz/ac at planting against an untreated check. No in-season fungicide application was made. The treatments were arranged in a paired comparison design and replicated eight times.

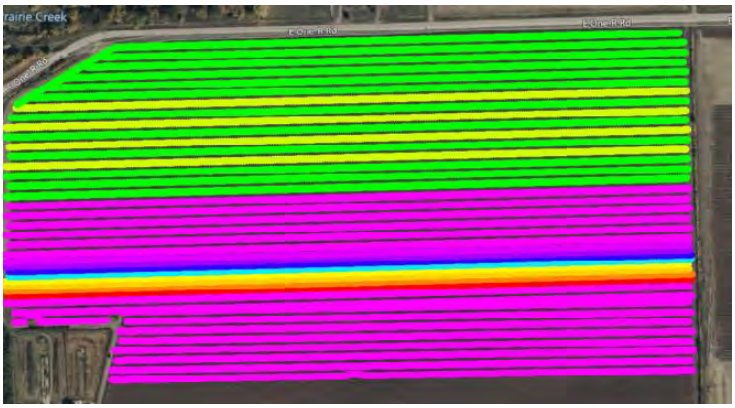


**Figure 1:** Project layout and design. The North half of the field was where the project was conducted. Green strips: Xyway® LFR® applications. Yellow strips: No Xyway® LFR®.

**Results:**

| | Stand Count (plants/ac) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Check | 107.75 A* | 9.9 A | 88 A | 972 A |
| Xyway® LFR® | 105.5 A | 9.7 A | 88 A | 952 B |
| P-Value: | 0.17 | 0.422 | 0.398 | 0.04 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans and Xyway™ LFR® cost of $15/ac.

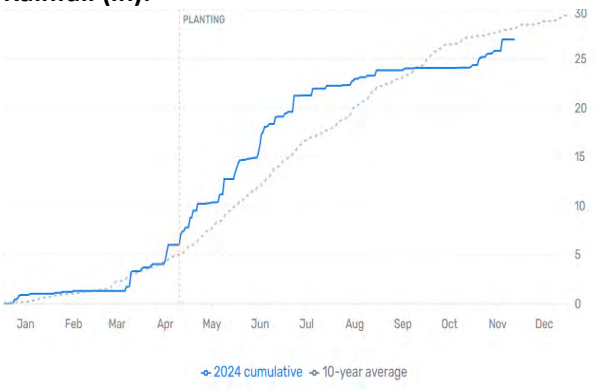
**Summary:**

- There were no significant differences in stand count, moisture or yield.
- After factoring in the cost of the product, the addition of Xyway™ LFR® resulted in a significantly lower marginal net return ($952/ac) than the untreated check ($972/ac).
- Field history and yearly disease pressure may influence fungicide selection and timing.

# Trivapro® Fungicide Application via Chemigation to Corn

**Study ID:** 1256139202401
**County:** Pierce
**Soil Type:** Thurman-Valentine complex; Thurman loamy fine sand
**Planting Date:** 4/22/24
**Harvest Date:** 10/7/24
**Row Spacing (in):** 30”
**Hybrid:** Pioneer® 1185AM
**Reps:** 4
**Previous Crop:** Soybean with rye cover crop
**Foliar Fungicides:** Variable

**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** In this study, Trivapro® fungicide was applied at 13.7 fl oz/acre to a corn field at R1 on July 18, 2024, via chemigation with the goal to protect yield and manage foliar fungal diseases like Tar Spot and Southern Rust. Trivapro® is a fungicide with three modes of action, and a very good efficacy rating for Tar Spot in the EC130 Insect, Weed, and Disease Management Guide. This research used visual disease assessments and combine yield monitoring to collect data on fungicide efficacy. During the season, this field had apparent weed pressure on the west half, and experienced a hail event during the first week of July (before tassel). The study design was a randomized complete block with 4 replications.

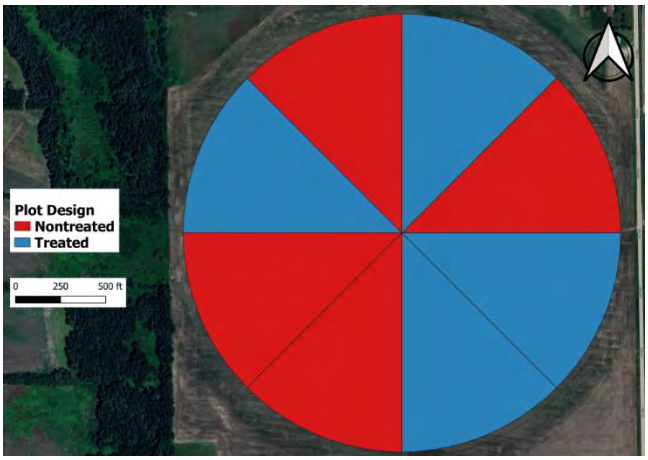



**Figure 1**: Project design of plots treated with Trivapro® (blue) and nontreated checks (red).

**Results:**

| Treatment | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Trivapro® | 14.4 A* | 230 A | 989 A |
| Untreated Check | 13 A | 227 A | 989 A |
| P-Value: | 0.21 | 0.77 | 0.90 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 14% moisture.
‡Marginal net return based on $4.35/bu corn, $25.96/ac cost for Trivapo®.

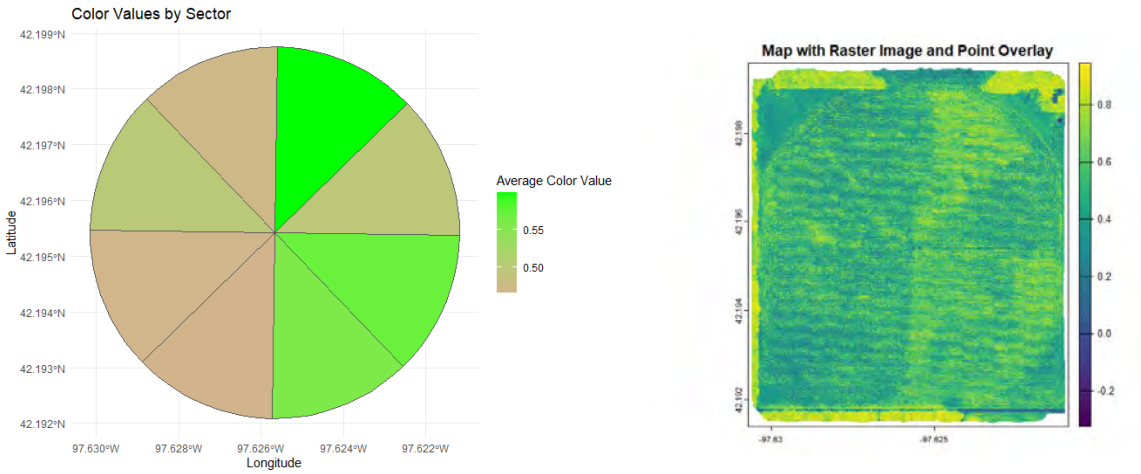



**Figure 2,3:** Drone and NDVI Imagery taken on 9/25/24 of the field following Trivapro™ applications against untreated check applications.

**Summary:**

- There were no differences in moisture, yield, or marginal net return between the application of Trivapro® and the untreated check.
- Drone and NDVI imagery did capture differences in color value after applications.
- In sites and years where foliar disease becomes an issue, fungicide may provide better protection.

# Innovative Corn Rootworm Management Corteva-UNL Collaboration

**Counties:** Dawson (3 fields) and Perkins (2 fields)
**Planting Date:** May 1 – May 18, 2024
**Harvest Date:** October 1-3, 2024
**Row Spacing (in):** 30
**Reps:** 5

**Previous Crop:** Corn
**Chemical applications:** Farmers applied according to conventional management.
**Irrigation:** Center Pivot Irrigation

**Introduction:** The western corn rootworm (WCR) is a major pest of continuous corn in Nebraska that has evolved resistance to multiple types of control strategies. Biological control can be an alternative and/or complementary control strategy together with conventional insecticides and Bt traits. WCR biological control can be achieved by entomopathogenic nematodes (EPNs- tiny worms that kill insects) and predatory insects. The planting of cover crops can support soil health, promote larger populations of predatory insects, and support EPNs. Therefore, our objectives are to determine if the application of persistent EPNs and the adoption of cover crops can improve pest management and soil health. We will measure: establishment and persistence of nematodes in the soil after application; western corn rootworm populations; root feeding injury from WCR; and soil health measures.

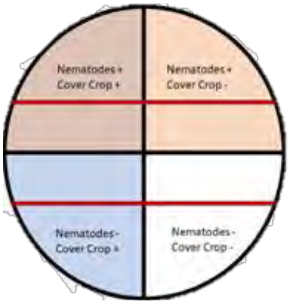



**Figure 1.** Field design for each 132-acre pivot.

Five on-farm research sites were identified in early 2022 in the Madrid and Lexington, Nebraska, areas. Each site is an approximately 132-acre center pivot irrigated field of continuous corn. At one site, the pivot was divided into four treatments: 1) cover crop, 2) entomopathogenic nematodes, 3) cover crop + entomopathogenic nematodes, 4) untreated control. At the remaining four sites, the cover crop treatment was restricted; therefore, only the nematode-applied and non-nematode treatments were implemented. Each grower managed WCR at their fields using Bt traits/and or insecticides as they normally would (conventional management), but three fields contain two strips of non-Bt corn without at-plant insecticides running through each quarter of the field (check strips- red lines on Fig. 1). In 2024, two fields were planted to soybeans to fulfill needs for the farmers' operations. One of the fields in corn was also converted to a dryland field. Two species of beneficial nematodes (EPNs) (Persistent BioControl, *Steinernema feltiae* 'NY 04' = 17 million/acre and *Heterorhabditis bacteriophora* Oswego = 25 million/acre) were applied to each field via center pivot irrigation systems or ground rig sprayer in late May of 2022. Sampling for beneficial nematodes was conducted at all fields, and monitoring of corn rootworm and beneficial insect populations was completed for fields in corn production during the summers of 2022, 2023 and 2024, including:

- Plant emergence cage sampling to see survival of WCR from belowground larvae to emerging adults.
- Root injury sampling to determine feeding damage from corn rootworm larvae.
- Nematode baiting soil sampling (Figure 2) for the presence of nematodes before and after application.

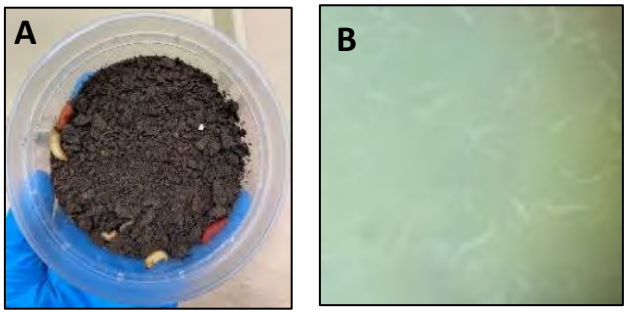



**Figure 2. A) Larvae infected with EPNs.** Baiting assays were created using soil samples collected in the fields. Wax moth larvae turned brick red or brown, indicating an infection with EPNS. **B) White trap containing EPNs.** The presence of EPNs was confirmed under the microscope for larvae that showed visual symptoms of infection. Nematodes were collected for further identification.

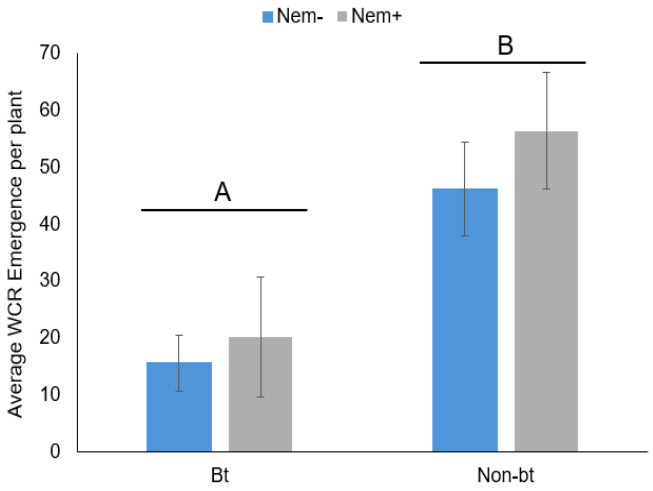



**Figure 3. WCR emergence per plant.** Average adult beetle emergence was significantly affected by Bt traits, but there was no significant effect of EPN treatment on WCR emergence.

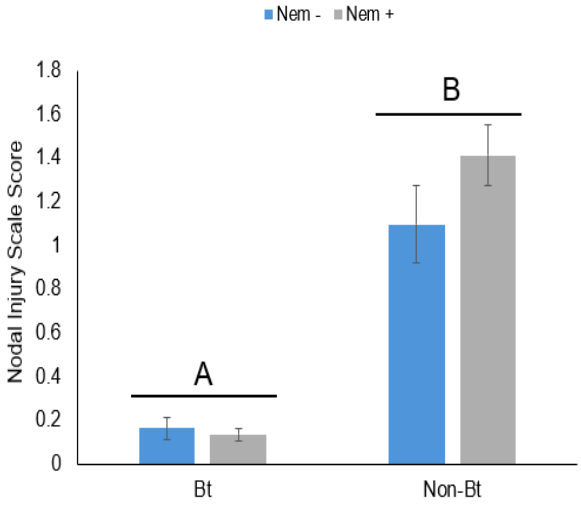



**Figure 4. Root injury from WCR feeding.** Mean root injury was measured using the 0-3 nodal injury scale. Root injury was significantly affected by Bt traits, but there was no significant effect of EPN treatment.

Average yield was calculated from a 1/1000$^{th}$ acre hand harvest sampling within each plot. Yield was significantly affected by field, as would be expected with different hybrid and management decisions made by growers, but there was no significant effect of EPN treatment or Bt traits.

**Persistence and ID of Nematodes:**

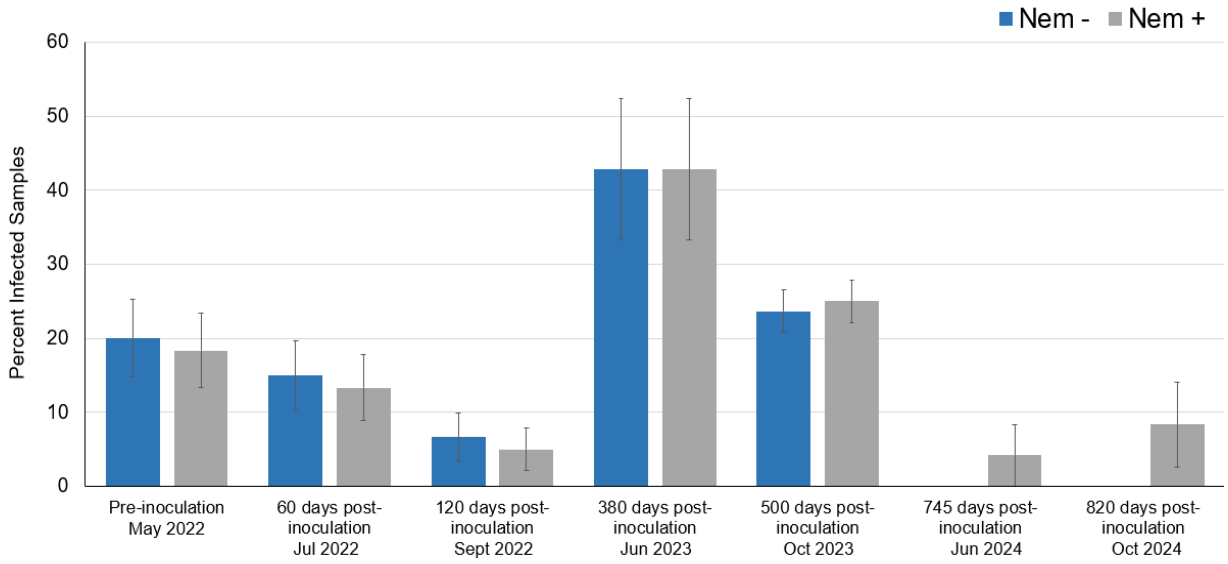



**Figure 5. Percent of soil samples infected.** Soil was collected from sampling areas and baited for nematodes using wax worm larvae. There were no statistically significant differences based on nematode treatment, however EPN detection was highest 380 days post inoculation. Samples were considered positive if nematodes were confirmed from at least one wax worm cadaver.

Nematodes recovered from the wax worm cadavers were genetically identified to determine if they were native EPNs or the commercially applied EPNs. Approximately 6% of the samples were infected by the commercial applied nematodes, occurring at 60 and 500 days post-inoculation. Native nematode species made up 42% of the identifications, and the remaining 52% were non-EPN species.

**Impacts of Cover Crops:**

At the cover crop site, inter-seeded cover crops were planted at V4 growth stage of corn using a Tye drill at a rate of 32 lbs per acre (Figure 7, A). In 2024, the mix included millet, annual ryegrass, turnips, radish, rapeseed, buckwheat, cowpea, red clover and dixie crimson clover. Assessments were made to evaluate cover crop growth and biomass and soil sampling was conducted in 2024 to evaluate soil health properties.

Cover crop growth was evaluated monthly during the growing season in July, August and September. The percent crop residue, bare ground, cover crop, and weed coverage were evaluated (Figure 8). There was significantly more bare ground and significantly less crop residue in the cover crop area compared to the no cover crop area, but no significant difference in the total weed cover (Table 1). September had significantly more cover crop growth than July and August. In all three sampling periods, the percent cover attributed to cover crop was significantly more than the non-cover crop (Table 2).

Cover Crop samples were collected on September 4, 2024 to calculate the biomass. Biomass ranged from 49 lbs/ac to 305 lbs/ac, and averaged 138 lbs/ac. However, it should be noted that by this date, several species in the cover crop mix were past the peak growth or no longer present in a high percentage, while others were still in earlier growth stages, so peak biomass may not have been sampled.

**Figure 7. Inter-seeded cover crops. Top:** Drill used to interseed cover crop. Photo from D. Batie. **Bottom:** Cover crop growth on Aug 1, 2024.

**Table 1. Average percent cover in 2024.**

| | % Crop Residue | % Bare Ground | % Weeds |
|---|---|---|---|
| Cover Crop | 36 A* | 51 A | 0.5 A |
| No Cover Crop | 69 B | 28 B | 2.0 A |
| P-Value | <0.0001 | <0.0001 | 0.2648 |

**Table 2. Percent cover crop by period.**

| | July | August | September |
|---|---|---|---|
| Cover Crop | 11 A* | 9 A | 21 A |
| No Cover Crop | 0 B | 0 B | 0 B |
| P-Value | 0.0002 | <0.0001 | 0.0013 |

*Values with the same letter are not significantly different at a 95% confidence interval

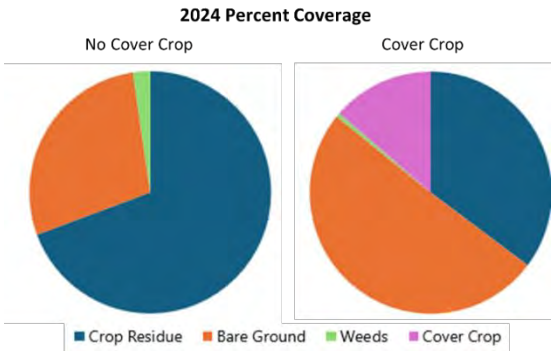



**Figure 8. Average percent cover for 2024.** Percent cover was averaged across the 3 sampling periods.

**Soil Test Results:**

**Table 3. Soil physical and chemical properties for 0-10 cm soil depth.**

| Treatment | Mean weight diameter of water-stable-soil aggregates (mm) | Water content at field capacity (cm3 cm-3) | Plant available water (cm3 cm-3) | pH | Soil Organic matter (%) | Nitrate-N (ppm) | Phosphorus (ppm) | Potassium (ppm) |
|---|---|---|---|---|---|---|---|---|
| Nem+ CC+ | 2.8±0.6 a | 0.4±0.01a | 0.2±0.01a | 5.5±0.5 | 5.2±0.7 | 9.5±7.0 | 31.0±11.3b | 402±65.1b |
| Nem + CC- | 2.7±0.4a | 0.4±0.02b | 0.3±0.03a | 5.4±0.2 | 4.8±0.5 | 9.5±3.8 | 26.6±8.0b | 312±41.7b |
| Nem- CC + | 1.8±0.2c | 0.4±0.03ab | 0.2±0.03b | 6.1±0.3 | 4.2±0.9 | 6.7±4.5 | 31.2±13.1b | 564±96.3a |
| Nem- CC- | 2.3±0.6b | 0.4±0.02a | 0.3±0.04a | 5.9±0.5 | 4.2±0.4 | 15.7±9.7 | 72.4±24.1a | 594±112.0 a |
| p-value | <0.0001 | 0.03 | 0.0005 | 0.05 | 0.06 | 0.29 | 0.001 | 0.0009 |

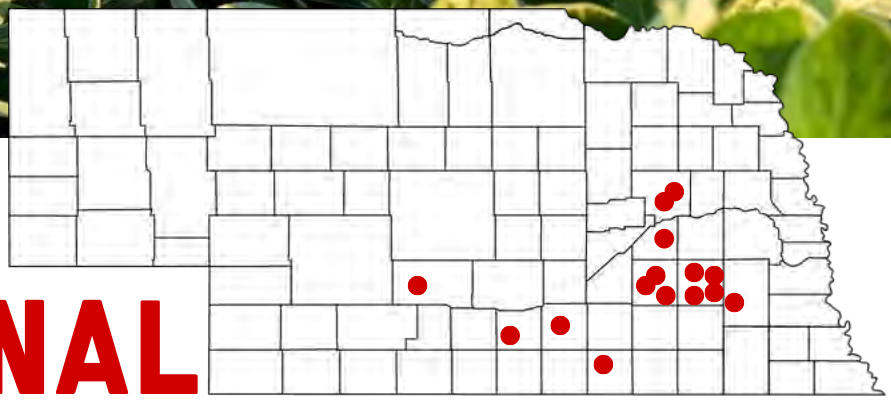
*Values with the same letter are not significantly different at a 95% confidence interval

Table 3 shows Nem + treatments had increased soil wet aggregate stability compared with Nem- in the upper 4 inches of soil depth. These results suggest that the application of nematodes, or potentially the application of 0.25 ac-in of water in spring 2022, influenced soil structural quality near the soil surface. However, the Nem+ treatments also showed lower potassium compared with Nem- treatments. The 10-20 cm soil depth results revealed a similar pattern with lower potassium in the Nem+ treatments and no other significant results. Additionally, soil biological properties were evaluated, with no significant effects of EPN application or cover crops on microbial biomass, total bacteria, Gram + bacteria, actinomycetes, Gram – bacteria, total fungi, arbuscular mycorrhiza, saprophytes or protozoa.

**Summary:**

- There was no significant impact of the EPN treatment on the WCR emergence per plant, root injury or yield, but we did see significant difference based on Bt treatment. These results indicate that there could have been poor establishment of the commercial nematodes, possibly due to environmental conditions, equipment malfunction, lower concentration of commercial nematodes than expected, or competition with native species.
- Unexpectedly, there were no statistically significant differences based on EPN treatment for the percent of samples positive for EPNs. A small percentage of identified nematodes were commercially applied species, occurring at the 60- and 500-day post inoculation dates in the nematode applied areas. Although commercially applied nematodes are present in the applied areas of the fields, the low recovery rate indicates that there was poor establishment at these sites. However, the larger than expected number of native EPNs recovered, could indicate that the native nematode population is more robust than previously thought.
- This was the completion of a three-year project, with 2024 data showing similar results to the previous years. Future work with EPNs includes looking at the non-target effects of applying commercial EPNs, as well as expanding the knowledge of native Nebraska EPNs. Previous data can be found in the 2023 On-Farm Research Results (page 156). https://on-farm-research.unl.edu/result-publications

For more information regarding Entomopathogenic Nematodes and Persistent BioControl, please visit https://www.persistentbiocontrol.com/.

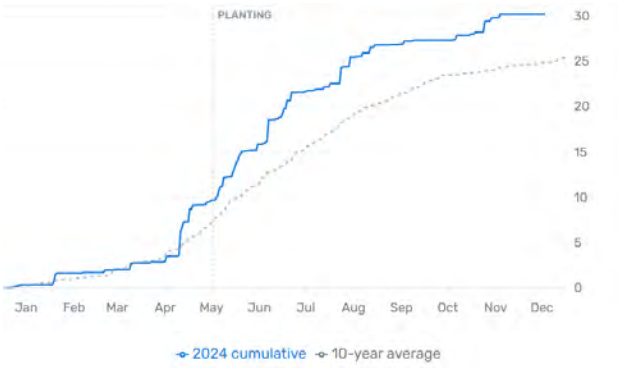


# NON-TRADITIONAL PRODUCTS

# Evaluating N Rates for Corn with and without Pivot Bio PROVEN® 40

**Study ID:** 0709047202401
**County:** Dawson
**Soil Type:** Hord silt loam
**Planting Date:** 5/16/24
**Harvest Date:** 10/29/24
**Population:** 33,000
**Row Spacing (in):** 30
**Hybrid:** Pioneer® P1164AM
**Reps:** 9
**Previous Crop:** Soybean
**Tillage:** Strip-till
**Herbicides:** ***Pre:*** 8 oz/ac dicamba + 1.5 qt/ac Bridger™ ATZ + 24 oz/ac glyphosate + 3 oz/ac mesotrione.
**Seed Treatment:** None
**Foliar Insecticides:** None
**Foliar Fungicides:** 10.5 oz/ac AzoxyProp Xtra on 7/26/24

**Fertilizer:** 15 gal/ac 10-34-0, 2.5 gal/ac of 12-0-0-26S, 0.25 gal/ac zinc chelate applied during strip-till on 4/12/24; 3 gal/ac LiftOff (8-24-4-1.2S-0.19Zn) applied during planting on 5/16/24; 21 gal/ac of 32-0-0, 2.5 gal/ac 12-0-0-26S sidedressed on 6/26/24.
**Irrigation:** Gravity, Total:
**Rainfall (in):**




**Introduction:** Nitrogen fertilizer is a significant input in corn systems. Additionally, N loss through leaching, volatilization, and denitrification pose environmental concerns and reduce profit. Pivot Bio PROVEN® 40 is an N-fixing bacterial inoculant that is expected to fix 40 lb N/ac over the growing season. Biological N fixation for cereal crop has the potential to increase N efficiency and decrease N loss. The objective of this study was to evaluate Pivot Bio PROVEN® 40 on corn yield and net return, and the potential for N rate reduction. Pivot Bio PROVEN® 40 was applied on the seed at planting with 8-24-4 (2 lb N/ac) starter fertilizer and was compared to an untreated check under three sidedress nitrogen rates (40, 80 and 120 lb N/ac). All treatments received 15 gal/ac of 10-34-0 and 2.5 gal/ac of 12-0-0-26S, in a strip-till application on April 12,2024. The total amount of N before sidedress application was 97 lb N/ac. The sidedress application occurred on June 26, 2024.

**Results:**

| Treatment: | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|
| 97 lb N/ac | 150 D | 653 D |
| 97 lb N/ac + Pivot Bio PROVEN® 40 | 150 D | 627 D |
| 137 lb N/ac | 180 C | 765 C |
| 137 lb N/ac + Pivot Bio PROVEN® 40 | 181 C | 746 C |
| 177 lb N/ac | 210 B | 876 AB |
| 177 lb N/ac + Pivot Bio PROVEN® 40 | 210 B | 851 B |
| 217 lb N/ac | 227 A | 930 A |
| 217 lb N/ac + Pivot Bio PROVEN® 40 | 231 A | 922 A |
| P-Value: | <0.001 | <0.001 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $0.60/lb N, and $24/ac for Pivot Bio PROVEN® 40

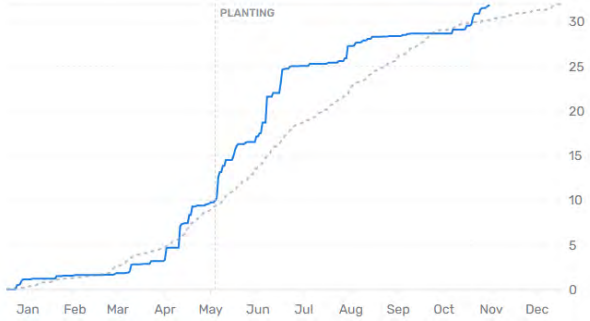
**Summary:**

- There were significant differences for yield and marginal net return.
- There were no significant differences in yields between individual sidedress rates when comparing treatments with or without Pivot Bio PROVEN® 40.
- Both treatments of 120lb of N sidedressed with and without Pivot Bio PROVEN® 40 yielded the highest (227 and 231 bu/ac respectively) and had the highest net return ($929.72, $921.87).
- Marginal net return was the lowest in treatments that did not receive any additional sidedress N.

# Evaluating N Rates and Pivot Bio PROVEN® 40 in Corn

**Study ID:** 0085141202402
**County:** Platte
**Soil Type:** Janude fine sandy loam
**Planting Date:** 5/18/24
**Population:** Variable 27,000-34,000
**Row Spacing (in):** 30
**Hybrid:** DEKALB® DKC62-69
**Reps:** 3
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 64 oz/ac of Degree Xtra®+ 3 oz/ac Balance® Flexx + 6 oz/ac Sterling® Blue + 28 oz/ac Roundup PowerMAX®
**Seed Treatment:** Acceleron®

**Fertilizer:** Preplan: 55 lb N/ac (3-18-24) At planting: 5 gal (6-24-6-1ZN) + pint of micronutrients
**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** This study evaluated the use of the Pivot Bio PROVEN® 40 as a replacement for commercial N fertilizer with and without cover crops terminated prior to planting. Prior to in-season N application, all treatments received 55 lb N/ac as urea (March 18) and 60 lb N/ac at planting (May 18). The treatments were established with the sidedress application on June 7. Soil samples were collected at 0-1' and 1-2' and soil N and organic matter content were assessed. Total N credit was used to calculate the total N applied using the UNL N recommendation calculator. The numbers are given in the tables below.

| Soil OM \| OM N Credit | Irrigation Water N Credit | Soil N Credit | Legume N Credit | Total N Credit | Yield Goal | UNL N Requirement Before Credits |
|---|---|---|---|---|---|---|
| % \| lb N/ac | Lb N/ac | Lb N/ac | Lb N/ac | Lb N/ac | (bu/ac) | Lb N/ac |
| 2.1 \| 73.4 | 5 | 26.5 | 0 | 104 | 250 | 335 |

| UNL Suggested N application | Applied N Pre Plant | Applied N at Planting | Required N at Sidedressing | Treatment1 | Treatment 2 | Treatment 3 |
|---|---|---|---|---|---|---|
| Lb N/ac | Lb N/ac | /ac | Lb N/ac | Lb N/ac | Lb N/ac | Lb N/ac |
| 231 | 55 | 60 | 116 | 120 | 80 | 80 + Pivot Bio |

**Results:**

| Treatment | | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| No Cover Crops | 195 lb N/ac | 16.2 ABC* | 203 A | 882 A |
| | 195 lb N/ac + Pivot Bio PROVEN® 40 | 15.9 BC | 202 A | 858 A |
| | 235 lb N/ac | 15.9 C | 208 A | 885 A |
| Cover Crops | 195 lb N/ac | 16.8 A | 203 A | 856 A |
| | 195 lb N/ac + Pivot Bio PROVEN® 40 | 16.7 AB | 198 A | 838 A |
| | 235 lb N/ac | 16.6 ABC | 210 A | 894 A |
| P-Value: | | 0.019 | 0.098 | 0.145 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, and $22/ac for Pivot Bio, and $20.4/ac for 120 lb N/ac.

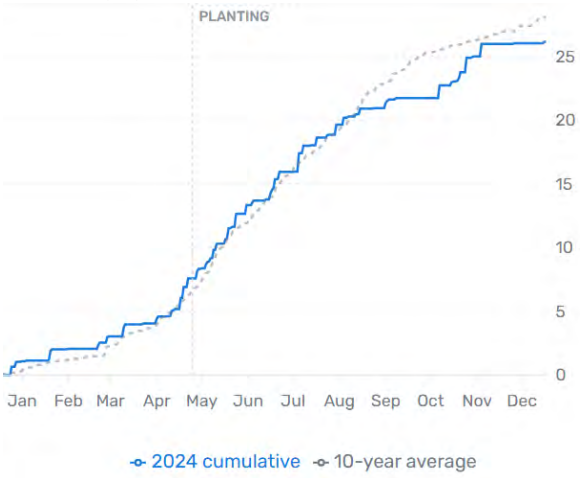
**Summary:**

- There was no significant difference in yield or marginal net return between the treatments. From this, the suggestion is to use the lowest rate of the tested N rates.
- The addition of cover crops (P:0.4) did not influence yield between N rates.
- The addition of Pivot Bio PROVEN® 40 did not influence yield when applying 195 lb N/ac (P:0.7).
- There were significant differences in moisture between treatments.
- Further testing should be done in future years to find the optimal N rate.

# Evaluating N Rates and Pivot Bio PROVEN® 40 in Corn

**Study ID:** 0085141202401
**County:** Platte
**Soil Type:** Boel fine sandy loam 0-2% slopes, rarely flooded
**Planting Date:** 4/30/24
**Population:** 35,000
**Row Spacing (in):** 30”
**Hybrid: DEKALB®** DKC103-70
**Reps:** 5
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 64 oz/ac Degree Xtra®+ 3 oz/ac Balance® Flexx + 6 oz/ac Sterling Blue® + 28 oz/ac Roundup PowerMAX®
**Seed Treatment:** Acceleron®
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** Planting: 5 gal/ac 6-24-6-1ZN with 16 oz/ac of Micronutrients applied in-furrow. 8 gal/ac of 32-0-0 dribbled on top.

**Irrigation:** Gravity
**Rainfall (in):**




**Introduction:** This study evaluated the use of the Pivot Bio PROVEN® 40 as a replacement of commercial N fertilizer. Prior to in-season N application, all treatments received 55 lbN/ac as urea (March 18) and 60 lb N/ac at planting (April 30). The treatments were established with the sidedress application on May 27.

Soil samples were collected at 0-1' and 1-2' and soil N and organic matter content were assessed. Total N credit was used to calculate the total N applied using the UNL N recommendation calculator. The numbers are given in the tables below.

| Soil OM \| OM N Credit | Irrigation Water N Credit | Soil N Credit | Legume N Credit | Total N Credit | Yield Goal | UNL N Requirement before Credits |
|---|---|---|---|---|---|---|
| % \| lb N/ac | Lb N/ac | Lb N/ac | Lb N/ac | Lb N/ac | (bu/ac) | Lb N/ac |
| 1.45 \| 50.8 | 10 | 31.5 | 0 | 92.3 | 250 | 335 |

| UNL Suggested N Application | Applied N Pre Plant | Applied N at Planting | Required N at Sidedress | Treatment 1 | Treatment 2 | Treatment 3 |
|---|---|---|---|---|---|---|
| Lb N/ac | Lb N/ac | Lb N/ac | Lb N/ac | Lb N/ac | Lb N/ac | Lb N/ac |
| 231 | 55 | 60 | 127.7 | 120 | 80 | 80 + Pivot Bio |

**Results:**

| Treatment and total N | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| 195 lb N/ac | 14.9 B* | 211 B | 917 B |
| 195 lb N/ac + Pivot Bio PROVEN® 40 | 14.9 B | 214 B | 911 B |
| 235 lb N/ac | 15.4 A | 239 A | 1,019 A |
| P-Value | 0.005 | 0.002 | 0.003 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $22/ac Pivot Bio (100 lb N/ac), and $20.4/ac 80 lb N/ac.

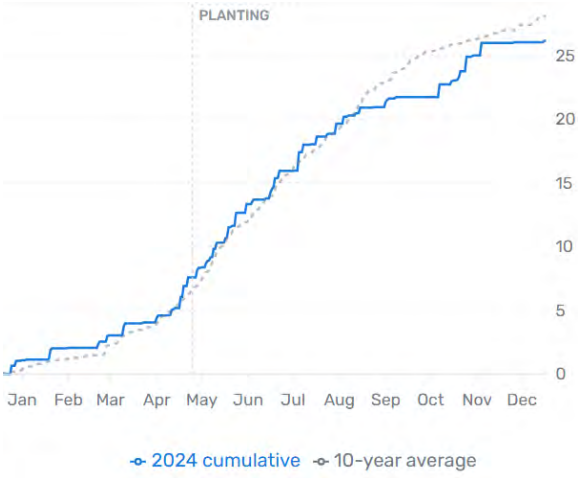
**Summary:**

- There were significant differences in moisture, yield, and marginal net return between the treatments.
- There was a significant difference in both yield and marginal net return between the main rate (120 lb N/ac) versus the check (80 lb N/ac) and Pivot Bio PROVEN® 40 (80 lb N/ac).
- There were no differences in yield or marginal net return between the 80 lb N/ac rate with or without Pivot Bio PROVEN® 40.

# Optimizing N Rate with and Without Pivot Bio PROVEN® 40

**Study ID:** 0064099202401
**County:** Kearney
**Soil Type:** Coly-Kenesaw silt loam; Hersh fine sandy loam
**Planting Date:** 5/9/24
**Harvest Date:** 9/24/24
**Population:** 32,000
**Hybrid:** Beck's® 5864 AM
**Reps:** 3
**Previous Crop:** Soybean
**Tillage:** Strip-till
**Herbicides:** ***Pre:*** 2 qt/ac Fulltime® + 44 oz/ac glyphosate ***Post:*** 2.5 qt/ac Acuron® + 24 oz/ac glyphosate + 5 oz/ac Status®
**Seed Treatment:** Pivot Bio PROVEN® 40 in half of planter
**Foliar Insecticides:** 7.3 oz/ac bifenthrin on 7/19/24
**Foliar Fungicides:** 7.1 oz/ac Veltyma® on 7/19/24. 7.1 oz/ac Veltyma® on 8/8/24.
**Fertilizer:** 15 lb N/ac + 51 lb P/ac fall of 2023; 64 lb N/ac + 9 lb K/ac + 6 lb S/ac from three fertigations

Note: Rye cover crop planted in fall of 2023, grazed with sheep until 4/1/24. Rye was chemically terminated 4/13/24. 20% green snap on July 7.
**Irrigation:** Pivot, Total: 8.6"
**Rainfall (in):**




**Introduction:** Nitrogen fertilizer is a significant input in corn systems. Additionally, N loss through leaching, volatilization, and denitrification pose environmental concerns and reduce profit. Pivot Bio PROVEN® 40 is an N-fixing bacterial inoculant that is expected to fix 40 lb N/ac over the growing season. Biological N fixation for cereal crops has potential to increase N efficiency and decrease N loss. The objective of this study was to evaluate Pivot Bio PROVEN® 40 on corn yield and net return. Pivot Bio PROVEN® 40 was applied as a seed treatment and compared to a check. The entire field received 80 lbs of N between a fall fertlizer application and 3 fertigation applications. Both the Pivot Bio PROVEN® 40 treatment and check were evaluated at four sidedress nitrogen rates, 0 lb N/ac, 40 lb N/ac, 80 lb N/ac, and 120 lb N/ac applied as 32% UAN. Early season stand counts were taken on June 18, 2024. These counts where taken shortly after a hail event.

**Results:**

| | Stand Count (plants/ac) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| 80 lb N/ac | 32,167 A | 230 D | 915 B |
| 80 lb N/ac + Pivot Bio PROVEN® 40 | 31,500 A | 230 D | 892 B |
| 120 lb N/ac | 32,000 A | 260 BC | 1024 A |
| 120 lb N/ac + Pivot Bio PROVEN® 40 | 31,500 A | 260 C | 997 A |
| 160 lb N/ac | 31,167 A | 269 ABC | 1040 A |
| 160 lb N/ac + Pivot Bio PROVEN® 40 | 31,333 A | 270 AB | 1020 A |
| 200 lb N/ac | 30,833 A | 271 A | 1026 A |
| 200 lb N/ac + Pivot Bio PROVEN® 40 | 31,000 A | 270 AB | 999 A |
| P-Value: | 0.600 | <0.0001 | <0.0001 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $0.60 N lb/ac and $26/ac for Pivot Bio PROVEN®

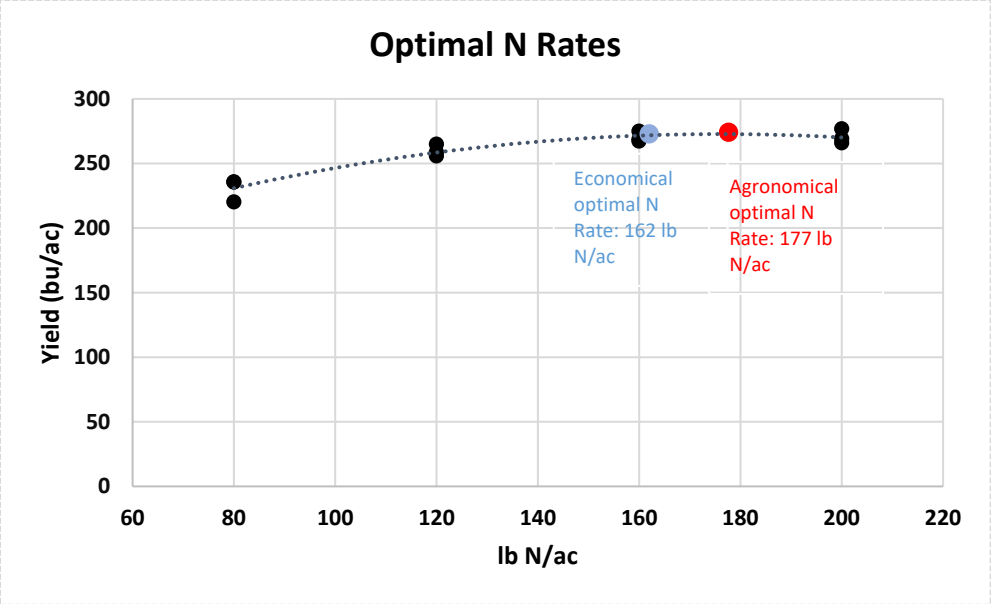



**Figure 1:** AONR and EONR regardless of the addition of Pivot Bio.

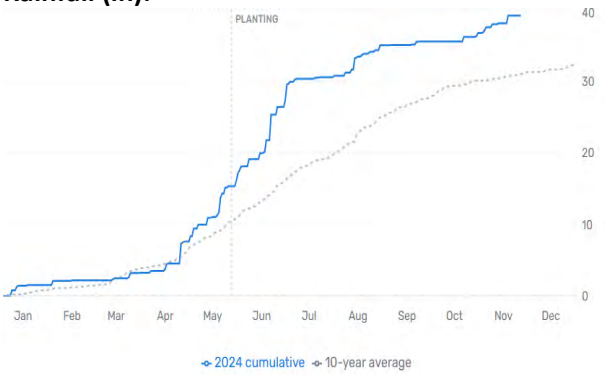
**Summary:**

- There were no differences for stand count between treatments.
- There were significant differences in yield and marginal net return between the treatments.
- The EONR was 162 lb N/ac, and the AONR was 177 lb N/ac, regardless of with or without Pivot Bio PROVEN® 40.
- The highest yields were achieved with 160 and 200 lbs N/ac with and without Pivot Bio PROVEN® 40.
- The 80 lb N/ac rates with and without Pivot Bio PROVEN® 40 resuted in lower marginal net returns compared to the other treatments.

# Comparing Standard Soybean Seed Treatment to a Biological Seed Treatment

**Study ID:** 1408143202439
**County:** Polk
**Soil Type:** Hastings silt loam
**Planting Date:** 5/27/24
**Harvest Date:** 10/02/24
**Population:** 133,000
**Row Spacing (in):** 30
**Variety:** Golden Harvest® GH2313XF
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 8 oz/ac dicamba + 6 oz/ac Zidua® Pro
***Post:*** 43 oz/ac glufosinate + 1.8 oz/ac Warrant® + 15.7 oz/ac clethodim; Respray 43 oz/ac Liberty®
**Seed Treatment:** Variable

**Foliar Insecticides:** None
**Foliar Fungicides:** 12.2 oz/ac Viatude® on 8/10/24
**Fertilizer:** NPSZ 12-45-5S-1ZN
**Irrigation:** Pivot 2.75”
**Rainfall (in):**




**Introduction:** Some growers are interested in alternative methods of protecting seeds and emerging crops from insects and plant disease beyond the typical seed treatments provided by traditional seed companies. Consideration of alternative methods may be due to treatment costs, implications to beneficial insects, impacts on the local environment, or human safety along with interests in disease incidence from white mold and sudden death syndrome. This study contrasted standard soybean treatments against biological seed treatments in areas with a field history of plant disease. The seed treatments were as follows:

**Standard Seed Treatment:** Redstar’s full seed treatment. Standard seed treatment was applied by the seed dealer.

**Biological Seed Treatment:** Blend of 2 oz PhycoTerra® ST, 1 oz Heads Up®, 1 oz N-Gage Ultra ST, 0.75 oz Bio ST VPH in 100 gal solution. In a second tank, 2 oz of Exceed SAR Soybean Inoculant was used per 100 gal. This seed treatment was applied by a local on-farm research cooperator.

| | |
|---|---|
| Replication 1 | Full Treatment (48 rows) |
| | Biological (48 rows) |
| Replication 2 | Biological (48 rows) |
| | Full Treatment (48 rows) |
| Replication 3 | Biological (48 rows) |
| | Full Treatment (48 rows) |
| Replication 4 | Full treatment (48 rows) |
| | Biological (48 rows) |

Each treatment was seeded for a width of 120’ using a 12 row planter and 30” row spacing with four replications. Rains impacted this field getting planted as early as the producer desired. The grower recorded nearly 19” from June 1, 2024, through September 30, 2024 (Figure 1), which led to portions of the field having soybeans drowned out or in standing water for periods of time. The most damaged areas of the field were excluded from the harvest data listed below. Late season stand counts were taken across three replications. Soybean lodging was observed due to late season environmental conditions. Moisture, grain yield, and marginal net return were evaluated.

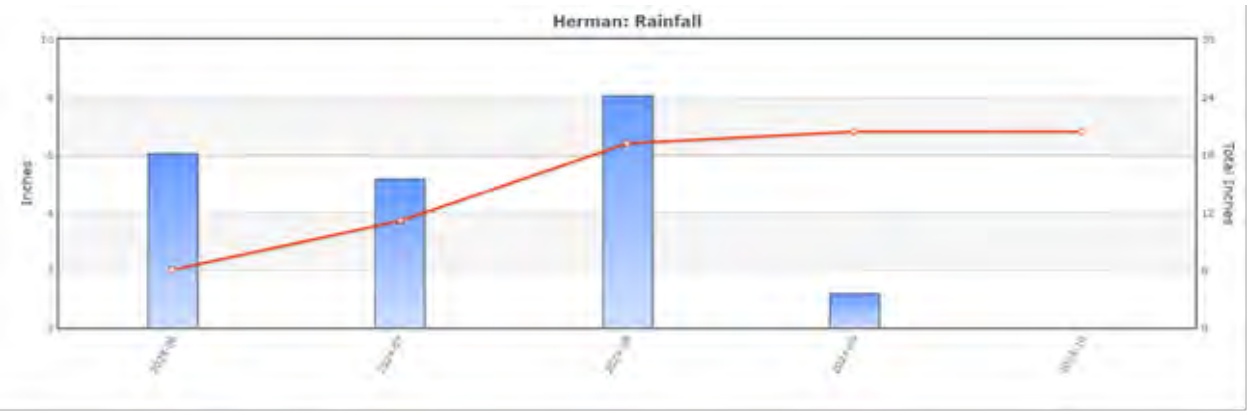



**Figure 1.** Rain bucket data shared by the grower for this field between June 1, 2024, through September 30, 2024.

**Results:**

| | Stand Count (plants/ac) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Redstar™ Full Seed Treatment | 103,750 A* | 8.9 A | 77 A | 825 A |
| Biological Seed Treatment | 103,875 A | 9.3 A | 75 A | 815 A |
| P-Value: | 0.91 | 0.39 A | 0.34 | 0.58 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, $17.10/ac for Redstar™ Full and $9.22/ac for biological seed treatment.

**Summary:**

- There were no significant differences in stand count, moisture, yield, or marginal net return between the treatments.
- Seed treatment efficacy may vary with disease pressure in the given growing season. Different results may be seen with earlier planting as the soybeans were planted in late May due to rain.

# Comparing Standard Soybean Seed Treatment to a Biological Seed Treatment

**Study ID:** 1525159202401
**County:** Seward
**Soil Type:** Hastings silt loam 0-1% slope; Fillmore silt loam
**Planting Date:** 5/10/24
**Harvest Date:** 10/1/24
**Seeding Rate:** 155,000
**Row Spacing (in):** 10" twin rows on 30" centers for a 20" gap
**Variety:** Pioneer™ 25A16E
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** No-Till into green planted rye
**Herbicides:** ***Early Post*** 20 oz/ac Roundup PowerMAX® 3, 4 oz/ac Anthem® MAXX, 1 qt/ac Enlist One®, 1 pt/ac Mn, 1 pt/ac Syntos, and 17#/100 gal AMS applied 5/28/24.
***Post:*** 20 oz/ac Roundup PowerMAX® 3, 1 qt/ac Enlist One®, 8 oz/ac Clethodim, 1 pt Mn, 1 pt/ac Syntos, 3 pt/ac Warrant® and 17#/100 gal AMS on 6/5/24.
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** None
**Irrigation:** Pivot, Total: 4.5"
**Rainfall (in):**


**Introduction:** Some producers are interested in alternative methods of protecting seeds from insects and disease beyond traditional insecticide/fungicide seed treatments. This can be due to cost, impacts to pollinators, soil microbes and the environment, or human safety. There's also interest in using seed treatments for disease suppression from white mold and sudden death syndrome. This study compared using a standard soybean seed treatment versus a biological seed treatment in a field with a history of white mold. The treatments were as follows:

***Treatment 1:*** Full Company Seed Treatment
***Treatment 2:*** Biological Seed Treatment *Blend of 2 oz PhycoTerra® ST, 1 oz Heads Up®, 1 oz N-Gage Ultra ST, 0.75 oz Bio ST VPH in 100 gal solution. In a second tank, 2 oz of Exceed Soybean Inoculant was used per 100 gal. Biological seed treatment was applied by the grower.*
***Treatment 3:*** Inoculated *2 oz of Exceed Soybean Inoculant per 100 gal.*
***Treatment 4:*** Untreated

Each treatment was seeded for a 20' width with a twin row planter on 10" spacings with seven replications. Rye had been planted after corn harvest in the field with the intention of using a roller crimper for better weed control. The rye was terminated by post-herbicide application on May 28 and then roller crimped on May 29 at a slight angle to the soybean rows. The rye provided excellent weed control. Some soybeans were damaged by the roller crimping as can be seen in the photos below.

Yield, grain moisture, test weight, and net return were evaluated. Stand counts were taken in each treatment following roller crimping, prior to the Soybean Management Field Day on 8/15/24, and prior to harvest in the same area of each treatment and rep. Only harvest stand counts are shown. The grower also wanted to note that the organic matter in this field is 4.6% in 0-10".

**Results:**

| Treatment | Harvest Stand Counts (9/23/24) (plants/acre) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Full Seed Treatment | 113,333 A | 7.4 A | 71 A | 751 B |
| Biological Seed Treatment | 105,000 A | 7.4 A | 6 A | 753 AB |
| Inoculated Seed | 106,000 A | 7.5 A | 70 A | 773 A |
| Untreated Seed | 99,000 A | 7.4 A | 70 A | 771 AB |
| P-Value: | 0.36 | 0.25 | 0.25 | 0.03 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybean, $27/ac for the standard seed treatment, $9/ac for the biological seed treatment, and $2/ac for the inoculant treatment.

**Summary:**

- There were no differences for harvest stand counts, moisture, or yield for any of the treatments.
- There was a difference between the marginal net return of the inoculated seed compared to the full company seed treatment.
- The results are consistent with what the grower found in three fields in 2023 (no yield difference between a full seed treatment and a biological seed treatment).

**2024 Pics:** Soybeans after roller crimping (top left); Pinched below cotyledon (top right and lower left); Early season stand counts after roller crimping (lower middle); Curve at base of some plants (lower right).





## 2023 Results:

**Field 1: Planted:** 5/2/23 **Harvested:** 9/28/23 **Seeding Rate:** 165,000 **Variety:** Pioneer® P23A40E
**Row Spacing (in):** 10” twin rows on 30” centers for a 20” gap **County:** Seward

**Photos:** (Top left) Tall and pollinating rye on May 19, 2023. (Top middle) Soybean with full traditional seed treatment with Ilevo with some halo effect. (Top right) Soybean with biological seed treatment. (Lower left) Early season stand counts. (Lower middle) Soybean with 2.5" from soil level to cotyledons. (Lower right) Harvesting lodged soybean with significant rye residue.

**Results:**

| | Stand Counts (5/19/23) | Stand Counts (6/5/23) | Moisture (%) | Test Weight (lb/bu) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Standard Seed Treatment | 92,000 | 132,000 | 10.2 A* | 56 A | 62 A | 828 A |
| Biological Seed Treatment | 94,000 | 138,000 | 10.2 A | 56 A | 61 A | 830 A |
| P-Value | N/A | N/A | 0.1996 | 0.766 | 0.102 | 0.845 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $13.76/bu soybean, $28/ac for the standard seed treatment, and $9.20/ac for the biological seed treatment.

**Summary:**

- It was difficult to take the early season stand counts in May due to the rye; therefore, counts may not be as accurate. Later irrigations resulted in additional soybean emergence leading to higher stand counts in June.
- There were no differences in moisture, test weight, yield, or net return between the two seed treatments.

**Field 2: Planted:** 5/10/23 **Harvested:** 10/23/23 **Seeding Rate:** 165,000 **Variety:** Pioneer® P30A75E
**Row Spacing (in):** 10" twin rows on 30" centers for a 20" gap **County:** York

**Photos:** (Top left) Rye on May 19 with soybean just beginning to emerge. (Top right) Biomass came on quickly as can be seen in this photo on June 5, with headed out rye biomass on the ground and soybean growing through it.

**Results:**

| | Harvest Stand Count (plants/ac) | Moisture (%) | Test Weight (lb/bu) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| Standard Seed Treatment | 145,200 A* | 9.7 A | 56 A | 65.7 B | 876 B |
| Biological Seed Treatment | 147,200 A | 9.7 A | 56 A | 67.1 A | 915 A |
| P-Value | 0.854 | 0.763 | 0.165 | 0.002 | <0.0001 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $13.76/bu soybean, $28/ac for the standard seed treatment, and $9.20/ac for the biological seed treatment.

**Summary:**

- There were no differences between the two treatments for harvest stand count, grain moisture, or test weight.
- Yield for the biological seed treatment was 1.4 bu/ac higher than the standard seed treatment.
- Marginal net return was $39/ac greater for the biological seed treatment compared to the standard seed treatment.

**Field 3: Planted:** 5/22/23 **Harvested:** 11/1/23 **Seeding Rate:** 200,000
**Variety:** Golden Harvest® GH3373E3
**Row Spacing (in):** 10” twin rows on 30” centers for a 20” gap **County:** Hamilton

| | Harvest Stand Count (plants/ac) | Moisture (%) | Test Weight (lb/bu) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| Standard Seed Treatment | 147,625 A* | 13.9 A | 57 A | 69 A | 931 A |
| Biological Seed Treatment | 146,375 A | 13.8 A | 57 A | 68 A | 931 A |
| P-Value | 0.906 | 0.899 | 0.177 | 0.195 | 0.942 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $13.76/bu soybean, $16.63/ac for the standard seed treatment, and $9.20/ac for the biological seed treatment.

**Summary:** There were no differences in stand counts, test weight, moisture, yield, or net return between the seed treatments evaluated.

# Comparing Standard Soybean Seed Treatment to a Biological Seed Treatment

**Study ID:** 1099185202401
**County:** Seward
**Soil Type:** Butler silt loam terrace 0-1% slopes, Lamo silty clay loam occasionally flooded, Muir silt loam 0-1% slopes and 1-3% slopes and rarely flooded, Hastings silty clay loam 3-7% slopes severely eroded
**Planting Date:** 5/30/24
**Harvest Date:** 9/30/24
**Seeding Rate:** 140,000
**Row Spacing (in):** 30”
**Variety:** Connect™ CT2323E
**Reps:** 3
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** None ***Post:*** 5 oz/ac Verdict® + 12 oz/ac Outlook® applied 6/3/24. 32 oz/ac Liberty® + 32 oz/ac Enlist® + 1.3 pt/ac Dual II Magnum® applied 6/28/24. 32 oz/ac Enlist® + 32 oz/ac glyphosate applied 7/13/24.

**Seed Treatment:** Variable
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** None
**Irrigation:** Pivot, 8”
**Rainfall (in):**


**Introduction:** Some growers are interested in alternative methods of protecting seeds and emerging crops from insects and plant disease beyond the typical seed treatments provided by traditional seed companies. Consideration of alternative methods may be due to treatment costs, implications to beneficial insects, impacts on the local environment, or human safety along with interests in disease incidence from white mold and sudden death syndrome. This study compared an untreated check against biological seed treatments in areas of a field with history of plant disease. The seed treatments were as follows:

**Untreated Seed:** No seed treatment.
**Biological Seed Treatment:** Blend of 2 oz PhycoTerra® ST, 1 oz Heads Up®, 1 oz N-Gage Ultra ST, 0.75 oz Bio ST VPH in 100 gal solution. In a second tank, 2 oz of Exceed Soybean Inoculant was used per 100 gal. Biological seed treatment was applied to the seed by a nearby on-farm research cooperator.

White mold and sudden death syndrome were not observed in this field in 2024. Thus, no plant disease ratings were taken and only yield and economics were assessed.

**Results:**

| | Harvest Stand Counts (plants/ac) (2 reps) | Yield (bu/ac) † | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Check | 103,000 | 70 A* | 768 A |
| Biological Seed Treatment | 107,000 | 70 A | 761 A |
| P-Value | -- | 0.98 | 0.42 |

*Values with the same letter are not significantly different at a 90% confidence level.

†Bushels per acre corrected to 13% moisture.

‡Marginal net return based on $11/bu soybean, $6.75/ac biological seed treatment cost.

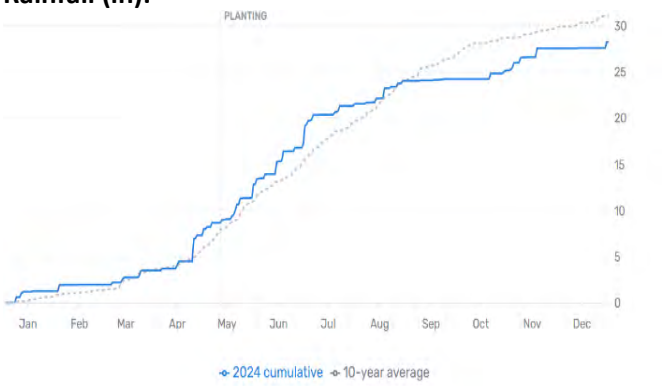
**Summary:**

- There were no significant differences in soybean yield and marginal net return between the untreated check and biological seed treatment.
- Soybeans were planted at the end of May in this study, which may negate the need for a soybean seed treatment due to warmer environmental conditions.

# Stride Bio® as Micronutrient Seed Treatment

**Study ID:** 1248185202401
**County:** York
**Soil Type:** Hastings silt loam 0-1% slope
**Planting Date:** 5/11/24
**Harvest Date:** 9/20/24
**Population:** 130,000
**Row Spacing (in):** 30”
**Variety:** Asgrow® AG24XF3
**Reps:** 5
**Previous Crop:** Corn
**Tillage:** Stalk Shredding- March
**Herbicides:** ***Pre:*** 6 oz/ac Zidua Pro® + 30 oz/ac glyphosate ***Post:*** 22 oz/ac XtendiMax® + 30 oz/ac glyphosate applied 5/26/24. 36 oz/ac Liberty® + 24 oz/ac glyphosate applied 6/23/24.
**Seed Treatment:** Variable

**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** None
**Irrigation:** Pivot 6”
**Rainfall (in):**




**Introduction:** Stride Bio® is an 80/20 talc graphic blend for planters that also contain Calcium, Magnesium, Sulfur, Iron, Manganese, and Zinc. It was shown to have a return on investment in Beck’s® and Precision Planting® research results. The growers were interested in an alternative to the usual graphite mixture, and they needed a talc/graphite seed coating at planting. They wanted to test this product on-farm research to see if it would increase yield and economics.

**Results:**

| | Stand Count (plants/ac) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Check | 85,200 A | 10.7 A | 78 A | 854 A |
| Stride Bio® | 85,200 A | 10.8 B | 78 A | 845 A |
| P-Value: | 0.99 | 0.1 | 0.98 | 0.16 |

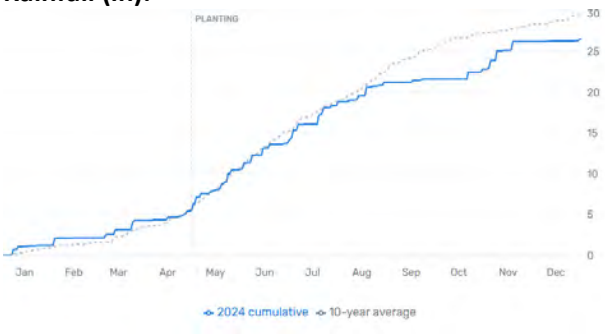
*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybean and $9/ac Stride Bio® cost

**Summary:**

- There were no significant differences between stand counts, yield, or marginal net return between treatments.
- There was a significant difference in moisture.
- Harvest stand counts were identical at harvest (85,200 plants/ac), suggesting similar soybean growth during the growing season.
- Rainfall was above average for most of the growing season (May-August).
- Further studies should be conducted in various planting scenarios to determine Stride Bio® efficacy.

# Evaluating BLACKMAX® 22 and Extract Powered by Accomplish® in Corn

**Study ID:** 1430001202401
**County:** Adams
**Soil Type:** Hastings silt loam 0-1% slope
**Planting Date:** 4/30/24
**Harvest Date:** 10/17/24
**Population:** 33,500
**Row Spacing (in):** 36”
**Hybrid:** Channel® 213-19STXRIB
**Reps:** 4
**Previous Crop:** Soybean
**Tillage:** No-till
**Herbicides:** ***Pre:*** 12oz/ac TriVolt™ + 22oz/ac Roundup® + 1qt/ac atrazine ***Post:*** 1.5qt/ac Harness® Maxx + 1pt/ac atrazine + 10oz/ac DiFlexx® + 22oz/ac Roundup PowerMAX®
**Foliar Insecticides:** 8 oz/ac Hero® on 7/15/24
**Foliar Fungicides:** 8oz/ac Delaro® Complete on 7/15/24
**Fertilizer:** 170 lb/ac 32%-0-0 UAN preplant, 5 gal/ac 10-34-0 in-furrow, V8: 35 lb N/ac (32-0-0) through pivot, R2/3- 35 lb N/ac (32-0-0)
**Irrigation:** Pivot, Total: 5.23”
**Rainfall (in):**




**Introduction:** Two plant nutrition products manufactured by Loveland Products were tested for their effect on corn yield. Extract® Powered by Accomplish® (Extract® PBA) and BLACKMAX® 22 were each applied at planting with 10-34-0 starter fertilizer. Extract® PBA is a blend of Accomplish® LM, a fertilizer biocatalyst, and an N source that promotes the release of nutrients from crop residue and soils. The goal of the product is to optimize plantability and crop emergence, and extend nutrient availability later into the growing season. The goal of BLACKMAX® 22 is to enhance applied nutrient availability and uptake, nutrient mineralization and solubility, and promote beneficial soil microbes.

Early season stand counts were taken on May 21, 2024, when the plants were in the V1 stage. This is the third year this grower has evaluated these products.

**Results:**

| | Stand Count (plants/ac) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Check | 31,750 A* | 14.9 A | 241 A | 1,050 A |
| BLACKMAX® 22 | 31,875 A | 14.8 A | 240 AB | 1,031 AB |
| Extract® PBA | 32,188 A | 15.0 A | 234 B | 1,012 B |
| BLACKMAX® 22 + Extract® PBA | 31,687 A | 14.9 A | 241 A | 1,032 AB |
| P-Value | 0.506 | 0.767 | 0.040 | 0.033 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $11/ac for BLACKMAX® 22, and $6.50/ac for EXTRACT PBA.

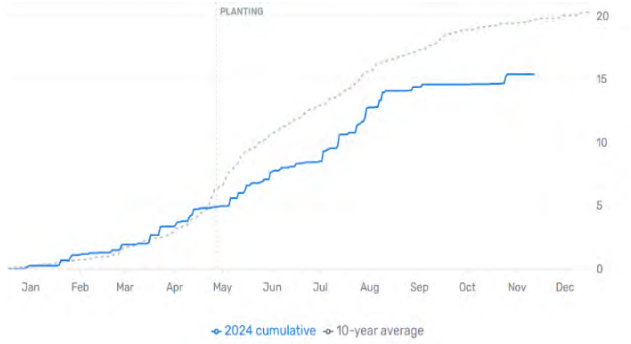
**Summary:**

- There were no significant differences in stand counts or moisture between treatments.
- A significant difference in yield was found between the check (241 bu/ac) and the Extract® PBA (234 bu/ac).
- Furthermore, a significant difference was found in marginal net return between the check ($1,050/ac) and the EXTRACT PBA ($1,012/ac).
- Planting conditions and scenarios may influence early season nutrient uptake.

# Compost Tea in Corn

**Study ID:** 1401105202401
**County:** Kimball
**Soil Type:** Altvan Fine sandy loam
**Planting Date:** 5/11/24
**Harvest Date:** 10/22/24
**Population:** 33,500
**Row Spacing (in):** 30”
**Hybrid:** Channel® 192-08VT2PRIB, 189-64VT2RIB
**Reps:** 6
**Previous Crop:** Wheat
**Tillage:** Strip-till
**Herbicides:** ***Pre:*** 10 oz/ac Verdict® + 28 oz/ac RT 3®
***Post:*** 3.2 oz/ac Zidua® + 26 oz/ac Roundup® + 8 oz/ac Clash™ Selective + 3.2 oz/ac Voyager®
**Seed Treatment:** Company standard
**Foliar Insecticides:** None
**Foliar Fungicides:** None

**Fertilizer:** 10 gal/ac 10-34-0, 25 gal/ac 28-0-0-5 applied during strip-till. 3 gal/ac 10-34-0 and 1 qt/ac zinc applied in-furrow. 135lbs chemigated mid-season.
**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** Compost tea is a liquid solution made by steeping compost in water. It is used as a natural fertilizer and soil conditioner for plants, providing a boost of beneficial microbes, nutrients, and organic matter leading to higher yields and better overall crop performance. Aerated compost tea was used in this study and this type involves using an air pump or aerator to oxygenate the water while it steeps the compost. A static pile compost was acquired from Soil Works, LLC in Yankton, SD and brewed at the rate of 10 gallons compost to 1500 gallons of water for 1 hour. The product was filtered then sprayed at a rate of 20 gal/ac. This study compared yield with and without compost tea.

**Soil Test Results:**

**Baseline Soil Sample 0-6" (May 2024):**

| pH | OM LOI % | Nitrate–N ppm N | P ppm | S ppm | K ppm | Ca ppm | Mg ppm | Na ppm |
|---|---|---|---|---|---|---|---|---|
| 6.7 | 1.9 | 12.0 | 34.4 | 5.8 | 169 | 440 | 88 | 19 |

**Results:**

| | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|
| Channel® 192-08VT2RIB + Tea | 193 A* | 797 B |
| Channel® 192-08VT2RIB Check | 208 A | 904 AB |
| Channel® 189-64VT2RIB + Tea | 215 A | 892 AB |
| Channel® 189-64VT2RIB Check | 216 A | 938 A |
| P-Value: | 0.225 | 0.061 |

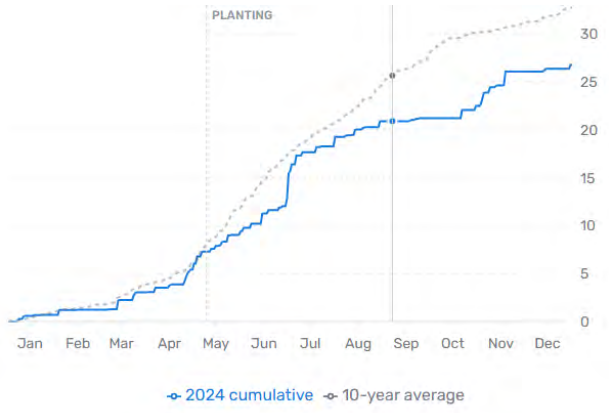
*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn and $42/ac for the tea (including application).

**Summary:**

- There were no significant differences in corn yield between the tea treatments and the different hybrids.
- There were significant differences between the treatments, with the 189-64VT2RIB check having a higher net return than the 192-08VT2RIB treatment with compost tea.

# Value of Compost Extract in a Nitrogen Trial

**Study ID:** 1555-109-2024-01
**County:** Lancaster
**Soil Type:** Pawnee clay loam 4-8% slopes and 6-11% slopes, eroded; Burchard clay loam 6-11% slopes; Mayberry silty clay loam 3-6% and 6-11% slopes, eroded.
**Planting Date:** 5/9/24
**Harvest Date:** 9/27/24
**Seeding Rate:** 25,000 seeds/ac
**Row Spacing (in):** 30”
**Variety:** Hybrid 85™ 23B50
**Reps:** 4
**Previous Crop:** Soybeans
**Tillage:** No-till
**Herbicides:** ***Pre:*** 12 oz Verdict®, 42 oz Roundup PowerMAX® on 5/1/24 ***Post:*** 0.9 oz/ac Accent® Q on 5/20/24; 1 oz Armezon®, 1 qt atrazine 4L, 12 oz DiFlexx® on 6/12/24
**Seed Treatment:** None
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** 32% UAN with 5% ThioSul applied with planter on 5/9/24
**Irrigation:** None
**Rainfall (in):**




**Introduction:** Some growers are seeking regenerative agriculture practices in hopes of reducing nutrient and chemical inputs. Biology from compost is thought to improve soil fertility and help release soil nutrients. This grower has traditionally produced compost extract and applied it with his nitrogen. The compost was extracted into water at a rate of 2 lb compost/8 gal of water and applied at 8 gal/ac in furrow at planting. This grower wanted to test any impacts on economics and yield from using the compost extract with a reduced rate of nitrogen. The treatments in the study are:

1) Check (90 lb N/ac as 32% UAN) Costing $57.60/ac
2) Reduced Check (83 lb N/ac as 32% UAN) Costing $53.12
3) Compost Extract Treatment (65 lb/ac N as 32% UAN + 8 gal/ac Compost Extract) Costing $45.60
4) 0 lb/ac Nitrogen Costing $0
5) Full Grower Treatment (65 lb/ac N as 32% UAN, 8 gal/ac Compost Extract, 4 oz/ac Ascend SL, 0.5 gal/ac Fish Hydrolosate, 1 qt Chelated Manganese 6%, 28 oz/ac Rhyzogreen) Costing $90.61

In Treatment 2, the grower was aiming for a Reduced Check rate of 65 lb/ac N so it would be comparable to the Compost Extract and Full Grower Treatments for total N. However, 83 lb/ac N was applied in error. Thus, the grower didn’t have as good of comparison as he desired to the Reduced Check without compost extract treatment. The study still shows the impact of nitrogen rate on yield and economics in this field, which is ultimately what the grower desired to learn.

This area received drought for the third year in a row. The corn was planted into terminated hairy vetch. Biomass from the hairy vetch was collected prior to termination and was shown to have 49 lb N/ac. Being a non-irrigated field, low mineralization occurred. Plants across the study area appeared nitrogen deficient and the 0 lb/ac N treatments were visible compared to the other treatments.

**Results:**

| | Stand Counts | Stalk Rot (%) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| Check | 20,375 A | 0.0 A | 12.5 B | 115 A | 444 A |
| Reduced Check | 20,250 A | 0.0 A | 12.7 B | 116 A | 450 A |
| Compost Extract | 21,375 A | 0.0 A | 12.5 B | 103 B | 401 B |
| 0 N | 20,250 A | 1.9 A | 14.4 A | 53 B | 231 D |
| Full Grower Treatment | 21,375 A | 0.0 A | 12.6 B | 103B | 358 C |
| P-Value | 0.42 | 0.44 | <0.001 | <0.001 | <0.001 |

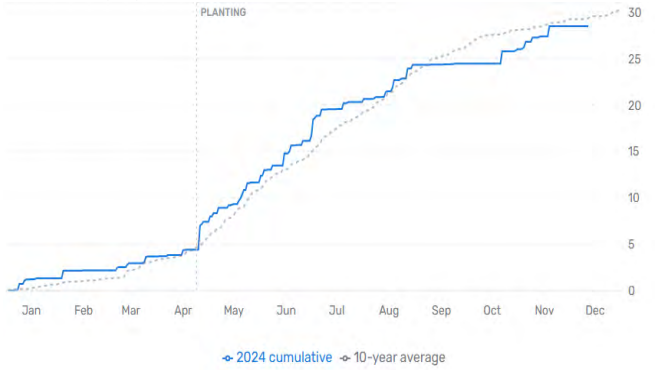
*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $0.60/lb nitrogen cost, $0.50/gal compost extract cost, $49.01/ac for Full grower treatment excluding the nitrogen cost.

**Summary:** Treatments with the Check (90 lb N/ac) and Reduced Check (83 lb N/ac) yielded significantly higher than other treatments (115-116 bu/ac). Marginal net return was also higher in these treatments. 0 N/ac resulted in the lowest yield (53 bu/ac) and marginal net return ($231/ac). Projects should continue to be tested in years with average or above average rainfall.

# Compost Extract Seed Treatment

**Study ID:** 0916185202401
**County:** York
**Soil Type:** Hastings silt loam 0-1%, 1-3%, 3-7% slopes; Hastings silty clay loam 3-7% slopes
**Planting Date:** 4/23/2024
**Harvest Date:** 9/27/2024
**Population:** 32,000
**Row Spacing (in):** 36”
**Hybrid:** Roeschley™ RX 12-70
**Reps:** 6
**Previous Crop:** Soybean
**Tillage:** Ridge-Till
***Post:*** 1.5 pt/ac Surestart II® + 1qt/ac atrazine + 16 oz crop oil on 5/8/24
**Seed Treatment:** Shieldcoat® (fungicide + insecticide)
**Foliar Insecticides & Insecticides:** None

**Fertilizer:** 3000 gal of fall applied hog manure slurry, injected. 15.5 gal 32% + 8% Thiosol (50 lb N) applied through fertigation 7/11/24
**Irrigation:** Pivot, Total: 8”
**Rainfall (in):**




**Introduction:** Some growers are interested in using biological seed treatments in addition to, or in place of, insecticide/fungicide seed treatments. The desire with a biological seed treatment is to build the microbial association with the root rhyzosheath quicker. The treatments in this study were:

*Check:* Company Seed Treatment Shieldcoat®

*Compost Extract Seed Treatment:* Shieldcoat® + Compost Extract Seed Treatment at 2-4 oz/50 lb of seed

To make the seed treatment, the grower used 1.5-2 lb of home-made compost/gal of water, then agitated the mixture for 1 hour. This resulted in a very thick slurry. The compost extract was then applied to the seed at a rate of 2-4 oz/50 lb of seed (3-4 gal/50 unit tote box). The grower allowed the seed to set and absorb for at least 30 minutes after treatment. Then seed was moved to the final box. The grower noted the corn did get sticky and did not flow well out of the boxes. One change in the future would be to consider dumping sooner than 30 minutes after application to see if that helps with the stickiness in the future.

This field had 7% greensnap in early July. Harvest stand count and stalk rot data were taken on September 30, 2024. This field had a decent amount of stalk rot at harvest due to fusarium crown rot.

**Indicator Complete Soil Test (6/21/24):**

| pH | OM LOI % | Nitrate–N Total lb | Bray–P ppm P | Sulfate–S ppm S | K ppm | Ca ppm | Mg ppm | Na ppm | CEC me/100g |
|---|---|---|---|---|---|---|---|---|---|
| 7.2 | 5.2 | 27.7 | 69.6 | 6.9 | 433 | 2501 | 310 | 38 | 16.4 |

**Results:**

| | Stand Counts (plants/acre) | Stalk Rot (%) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|
| Check | 30,000 A* | 45 A | 20.6 A | 20 B | 898 B |
| Compost Extract Seed Treatment | 29,000 A | 35 A | 20.5 A | 215 A | 931 A |
| P-Value | 0.43 | 0.35 | 0.74 | 0.005 | 0.006 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $1/ac biological seed treatment

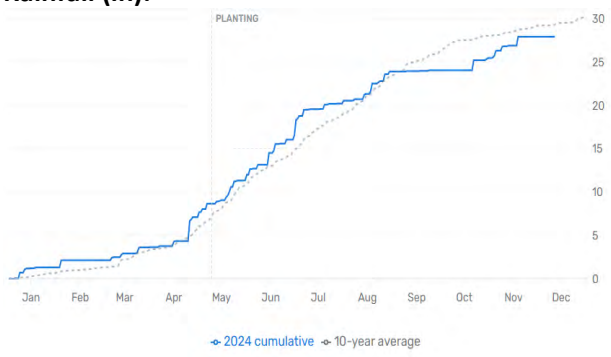
**Summary:**

- There were no significant differences in stand counts, stalk rot, or moisture between treatments.
- A significant difference in yield was found between the addition of the compost extract seed treatment (214.7 bu/ac) and the check (206.4 bu/ac).
- This difference was found again in the marginal net return, with the biological seed treatment having a higher return ($931/ac) against the untreated check ($898).

# Compost Extract Starter with Varied Nitrogen Rates

**Study ID:** 0916185202401
**County:** York
**Soil Type:** Hastings silt loam
**Planting Date:** 5/9/24
**Harvest Date:** 9/30/24
**Seeding Rate:** 32,000
**Row Spacing (in):** 36”
**Hybrid:** Channel® 214-22
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** Ridge-till. No tillage passes.
**Herbicides:** ***Pre:*** 4 oz/ac Anthem Maxx® applied 4/30/24.
VE: 22 oz/ac glufosinate 12 oz/ac Outlook® applied 5/14/24.
**Seed Treatment:** Channel® seed treatment SB500 + compost extract seed treatment

**Fertilizer:** 5.5 Gallons 32% + 8% Thiosol (50# N) applied through fertigation 7/9/24
**Irrigation:** Pivot, Total 8”
**Rainfall (in):**




**Introduction:** This grower had seen an organic matter increase in his interseeded cover crop study when he had combined cover crops with soil applied biology via homemade compost extract. The goal of this study was to determine if he could replicate that organic matter increase on a different field. When adding biology, cover crops may aid in retaining carbon so the microbes don’t burn excess carbon. To aid in offsetting carbon loss, the entire field was interseeded with dutch white clover (8 lb/ac) on April 4, 2023. The clover was maintained in the field for a second year between the ridges. Glufosinate was sprayed pre-emerge on April 30, 2024, to "turn it brown" so it didn't compete with emerging corn. The clover eventually regrew but was not as dense as prior to the glufosinate application.

In Year 1, the grower saw no yield reduction between the Full Nitrogen Check Treatment of 170 lb N/ac vs. 110 lb N/ac plus his homemade compost extract. With no yield difference, he and other peers using compost extracts wondered if they were still over-applying nitrogen when using the extracts.

For a 7 gallon/ac homemade compost extract in-furrow at planting, this grower uses: 2 lb of compost in 7 gallons of water, ¼ lb dry fish amino acid, 8 oz of 12% humic acid, 12 oz SEA-CROP®.

In Year 2, the grower wanted to test nitrogen ramps with his homemade compost extract in order to determine any yield and economic differences. The yield goal was 240 bu/ac. Pre-plant nitrogen rates ranged from 0 to 140 lb N/ac. applied as UAN 32% via coulter injection. All fertilizer was mixed with 8% thiosol and 64oz/100gal of humic acid. On July 9, 2024, 50 lb N/ac was applied via fertigation through the pivot with 8% Thiosol. This resulted in the following treatments:

***Check:*** *190 lb N/ac (140 + 50), no compost extract in furrow*
***Reduced N Check:*** *120 lb N/ac (70 + 50), no compost extract in furrow*
***Reduced N + Extract:*** *120 lb N/ac (70 + 50) with compost extract starter in furrow*
***Reduced N + Extract:*** *100 lb N/ac (50 +50) with compost extract starter in furrow*
***Reduced N + Extract:*** *80 lb N/ac (30 + 50) with compost extract starter in furrow*

**Results:**

| | Stand Counts (plants/ac) | Stalk Rot (%) | Moisture (%) | Yield (bu/ac)† | Nitrogen Use Efficiency (NUE) | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| 80 lb N/ac + Extract | 30,000 A | 88.8 A | 18.1 A | 204 B | 0.39 D | 1,153 A |
| 100 lb N/ac + Extract | 29,833 A | 87.5 A | 17.7 A | 202 B | 0.50 C | 1,132 A |
| 120 lb N/ac + Extract | 30,167 A | 81.7 A | 17.7 A | 215 AB | 0.56 B | 1,200 A |
| 120 lb N/ac | 29,000 A | 83.8 A | 17.9 A | 209 AB | 0.57 B | 1,172 A |
| 190 lb N/ac | 29,000 A | 83.8 A | 17.8 A | 217 A | 0.87 A | 1,182 A |
| P-Value: | 0.12 | 0.24 | 0.2 | 0.04 | <0.001 | 0.2 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $7.50/ac for homemade compost extract and $0.53/lb N.

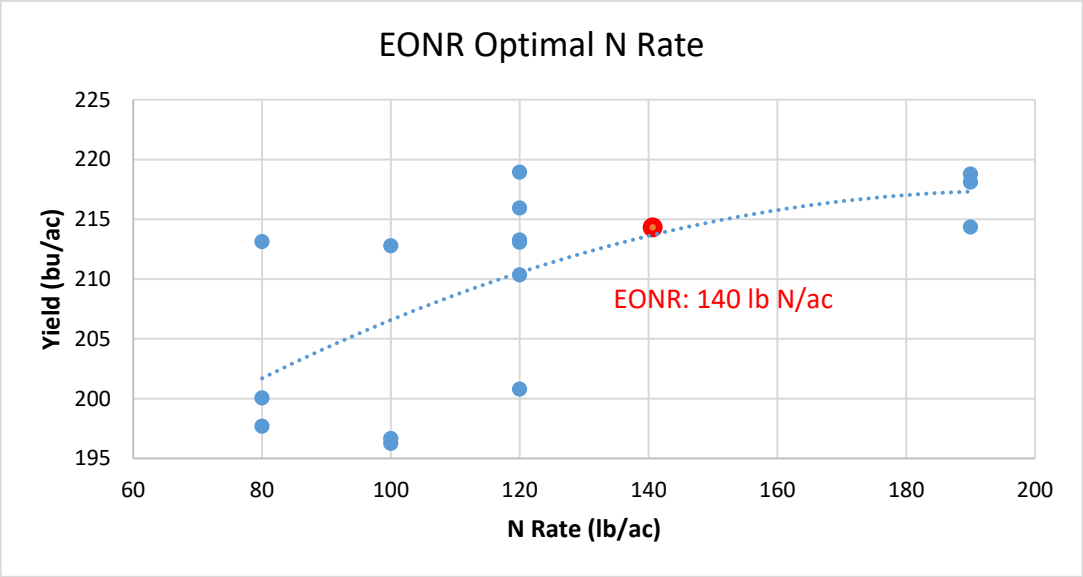



**Figure 1:** Economically Optimal N Rate

**Summary:**

- There was a significant difference in yield between applying 190 lb N/ac (217 bu/ac) compared to a reduction of N in either 100 lb N/ac + extract (201.9 bu/ac) or 80 lb N/ac + extract (203.6 bu/ac).
- The calculated EONR (140 lb N/ac) was lower than the growers traditional full rate of N (170 lb N/ac).
- The addition of Extract did result in a higher yield when applying 120 lb N/ac (P:0.09).
- The hybrid in this field was impacted by Fusarium crown rot and had high levels of stalk rot in spite of the standing plants prior to harvest. This most likely impacted overall yields in the field.
- A 50 lb N/ac rate (0 lb N/ac at planting + 50 lb N/ac via fertigation) had one replication and yielded 180.7 bu/ac with a nitrogen use efficiency of 0.28.

**Year 1 (2023):**

**Introduction:** With increasing nitrogen costs prompting producers to look at alternatives, this study evaluated two biological products at different nitrogen rates to determine any impacts on yield and economics. No noticeable differences were observed throughout the growing season between treatments. With the goal of increasing soil microbes, there is also the realization they may increase decomposition of

soil carbon. To aid in offsetting carbon loss, the entire field was interseeded with dutch white clover (8 lb/ac) on April 4, 2023. The treatments in the study are:

1) Check which received 170 lb N/ac as anhydrous ammonia on March 25, 2023.

2) 7 gallons/ac homemade compost extract in-furrow at planting (2 lb of compost in 7 gallons of water, ¼ lb dry fish amino acid, 8 oz humic acid, 12 oz SEA-CROP®), which received 110 lb N/ac as anhydrous ammonia on March 25, 2023.

3) 6 gallons/ac HyprGrow by Elevate Ag in-furrow at planting (1.5 gallons HyprGrow, ¼ lb dry fish amino acid, 4.5 gal water), which received 110 lb N/ac as anhydrous ammonia on March 25, 2023.

The anhydrous ammonia application was made 10" from the planting row. Yield and net return were evaluated.

**Background Haney Soil Tests 0-8" (March 2023):**

| pH | OM LOI % | Soil Respiration $CO_2$-C ppm C | Total Nitrogen ppm N | Organic Nitrogen ppm N | Total Organic Carbon ppm C | Soil Health Calculation |
|---|---|---|---|---|---|---|
| 7.3 | 3.9 | 95.5 | 37.3 | 28.0 | 227 | 16.89 |

**Photos:** (Top left): Dutch white clover emerging (May 9, 2023); (top middle) Good clover growth between corn rows (July 19, 2023); (top right) Clover matted down late in season. A few waterhemp were observed in the corn row but otherwise the field was fairly weed-free (September 6, 2023). (lower left): In ridge-till

systems, black nightshade can be problematic. The field was not ridged in 2023, however, enough seed was present in the seedbank to have heavier nightshade pressure in portions of the field.

While this is a biological study, no differences were observed amongst the treatments in the corn. However, biomass samples of the clover taken Sept. 11, 2023, resulted in 160 lb/ac biomass, 38 lb/ac carbon, and 3 lb/ac nitrogen.

**Results:**

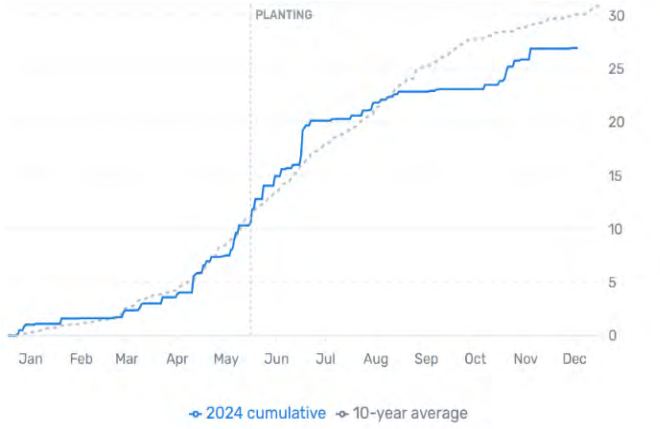
| | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|
| Check | 249 A* | 1,345 A |
| Elevate Ag HyprGrow | 246 A | 1,361 A |
| Homemade Compost Extract | 246 A | 1,369 A |
| P-Value | 0.548 | 0.228 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $5.91/bu corn, $7.13/ac for homemade compost extract, $14.65/ac for Elevate Ag HyprGrow, and $0.73/lb N.

**Summary:** There were no differences in yield or net return among the treatments evaluated. This study will continue on the same strips for a few years.

# Biological Treatment Study - Year 3

**Study ID:** 1395159202401
**County:** Seward
**Soil Type:** Muir silt loam; 1-3% slopes
**Planting Date:** 5/30/24
**Harvest Date:** 9/30/24
**Population:** 140,000
**Row Spacing (in):** 30”
**Hybrid:** Connect™ CT2323E
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** 5 oz/ac Verdict® + 12 oz/ac Outlook® ***Post:*** 32 oz/ac Liberty® + 32 oz/ac Enlist One® + 1.3 pt/ac Dual II® on 6/28/24. 32 oz/ac Enlist One® + 32 oz/ac glyphosate on 7/13/24
**Seed Treatment:** Variable
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** None**Irrigation:** Pivot 6-8"
**Rainfall (in):**




**Introduction:** With increasing nitrogen costs, there is the thought that increasing microbes in the soil from biological products may help with releasing nutrients, thus allowing for less synthetic nitrogen applied. This long-term study evaluated several biological products at different nitrogen rates to determine any impacts on yield and economics. Years 1 and 2 compared a check treatment of nitrogen to reduced rates of nitrogen with the addition of biologicals such as Johnson Su compost extract or Pivot Bio® in corn. All treatments have remained on the same strips over time.

This is the third year of this study. The grower chose to grow soybeans and see if any differences could be observed in the treatment strips. Only the check treatment and Johnson Su compost extract were used on the same treatment strips as before. Johnson-Su compost was produced as an aerobic static compost made from straw and cow manure. It was extracted into water at a rate of 3lbs compost/8 gal of water and applied at 8 gal extract/ac in furrow at planting. Biology from compost is believed to improve fertility and help release soil nutrients. The treatments included applying the Johnson-Su compost extract in furrow at planting against an untreated check. Only 1 rep of stand counts were taken on 9/30/24, the day of harvest due to lodged soybeans. Follow-up Haney and PLFA tests will be taken in September 2025 to determine any changes in soil microbial content over time.

**Results:**

| | Stand Count (plants/ac) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Untreated Check | 105,000 | 9.2 A* | 70 A | 770 A |
| Johnson-Su Compost Extract | 104,000 | 9.6 A | 69 A | 751 A |
| P-Value: | - | 0.42 | 0.48 | 0.35 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, and $5/ac for Johnson-Su compost extract.

**Summary:**

- There was no significant difference found in yield between the addition of compost extract (69 bu/ac) and the untreated check (70 bu/ac).

- Furthermore, no significant difference was found in moisture or marginal net return between the two treatments.

# Summary of Previous Years

## Year 1 (2022)

Phospholipid fatty acid (PLFA) and Haney tests for the check and biological treatments at 0-8” depth taken on September 7, 2022, for one replication. No stats due to one rep.

| | Total Biomass (ng/g) | Diversity Index | Total Bacteria Biomass (ng/g) | Total Fungi Biomass (ng/g) | Solvita® (ppm C) | Haney Soil Health Score |
|---|---|---|---|---|---|---|
| | ---------- 2022 ---------- | | | | | |
| Check | 4040 | 1.02 | 1376 | 60 | 102.3 | 12.9 |
| Johnson-Su High | 3230 | 0.95 | 1108 | 24 | 125.8 | 16.4 |
| Turned Compost High | 2728 | 0.80 | 841 | 17 | 111.8 | 15.7 |
| Pivot Bio | 4381 | 1.11 | 1559 | 97 | 141.7 | 19.6 |

**Treatments:**

**1. Check (total 142 lb N/ac):** 48 lb N/ac with 2.75 gal/ac AgroLiquid® Pro-Germinator® 9-24-3-0.1% Iron and 0.25 gal zinc sulfate (4%) applied at planting and 94 lb N/ac applied as 32% UAN and thiosulfate on June 23.

**2. Johnson-Su Compost High (total 106 lb N/ac):** 48 lb N/ac at planting with 8 gal/ac compost extract in-furrow and 58 lb N/ac applied as 32% UAN and thiosulfate on June 23.

**3. Johnson-Su Compost Low (total 48 lb N/ac):** 48 lb N/ac at planting with 8 gal/ac compost extract in-furrow.

**4. Turned Compost High (total 106 lb N/ac):** 48 lb N/ac at planting with 8 gal/ac compost extract in-furrow and 58 lb N/ac applied as 32% UAN and thiosulfate on June 23.

**5. Turned Compost Low (total 48 lb N/ac):** 48 lb N/ac at planting with 8 gal/ac compost extract in-furrow.

**6. Pivot Bio PROVEN® 40 (total 106 lb N/ac):** 48 lb N/ac with 2.75 gal/ac AgroLiquid® Pro-Germinator® 9-24-3-0.1% Iron and 0.25 gal zinc sulfate (4%) applied at planting and 58 lb N/ac applied as 32% UAN and thiosulfate on June 23. Pivot Bio PROVEN® 40 was applied with starter at planting.

| | Stand Count (plants/ac) | Stalk Rot (%) | Test Weight (lb/bu) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Check | 31,500 A* | 31.88 C | 58 A | 16.0 A | 235 A | 1,399 A |
| Johnson-Su High | 31,500 A | 46.88 BC | 58 A | 15.4 A | 220 AB | 1,365 A |
| Johnson-Su Low | 31,000 A | 75.63 A | 58 A | 14.9 A | 167 C | 1,095 C |
| Turned Compost High | 30,500 A | 58.25 AB | 58 A | 15.5 A | 212 AB | 1,315 AB |
| Turned Compost Low | 29,625 A | 59.38 AB | 58 A | 15.6 A | 164 C | 1,068 C |
| Pivot Bio Proven® 40 | 31,625 A | 61.88 AB | 58 A | 15.6 A | 195 B | 1,155 BC |
| P-Value | 0.276 | 0.004 | 0.659 | 0.697 | <0.0001 | 0.0001 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.

‡Marginal net return based on $6.57/bu corn, $6/ac for Turned compost, $4/ac for Johnson-Su, $21/ac for Pivot Bio PROVEN® 40, $1.27/lb of sidedress N, and $28/ac for starter.

**Summary (Year 1, 2022):** There were no differences in stand counts, grain moisture, or test weight among the treatments evaluated. Stalk rot varied greatly among the treatments and was lowest for the check treatment. The check treatment had the highest yield. Yields for Johnson-Su and turned compost were significantly higher when the treatment had an additional 58 lb N/ac compared to the same treatments with no sidedress N.

## Summary of Previous Years (Continued)

## Year 2 (2023)

**Treatments:**

Check High (nothing applied in-furrow; total of 188 lb N/ac)
Check Low (nothing applied in-furrow; total of 144 lb N/ac)
Johnson-Su High (Johnson-Su applied at 8 gal/ac in-furrow; total of 188 lb N/ac)
Johnson-Su Low (Johnson-Su applied at 8 gal/ac in-furrow; total of 144 lb N/ac)
Liquid Pro + Zn High (Liquid Pro + Zn in-furrow; total of 188 lb N/ac)
Liquid Pro + Zn Low (Liquid Pro + Zn in-furrow; total of 144 lb N/ac)
Pivot Bio PROVEN® 40 High (Pivot Bio PROVEN® 40 applied in-furrow; total of 188 lb N/ac)
Pivot Bio PROVEN® 40 Low (Pivot Bio PROVEN® 40 applied in-furrow; total of 144 lb N/ac)

| | Harvest Stand Count (plants/ac) | Stalk Rot (%) | Test Weight (lb/bu) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|---|---|
| Check | 32,000 A* | 39.17 AB | 59 A | 16.3 A | 245 A | 1,419 A |
| Reduced Check | 31,500 A | 29.17 AB | 59 A | 16.0 A | 233 A | 1,379 A |
| Johnson-Su High | 31,833 A | 38.33 AB | 59 A | 16.7 A | 242 A | 1,392 A |
| Johnson-Su Low | 30,167 A | 58.33 A | 59 A | 15.5 A | 227 A | 1,334 A |
| Liquid pro + Zn High | 31,500 A | 30.00 AB | 58 A | 16.9 A | 244 A | 1,384 A |
| Liquid pro + Zn Low | 30,833 A | 37.50 AB | 59 A | 16.3 A | 237 A | 1,373 A |
| Pivot Bio PROVEN® 40 High | 32,667 A | 30.83 AB | 58 A | 15.9 A | 244 A | 1,391 A |
| Pivot Bio PROVEN® 40 Low | 31,667 A | 21.67 B | 59 A | 15.9 A | 237 A | 1,383 A |
| P-Value | 0.669 | 0.072 | 0.409 | 0.314 | 0.886 | 0.990 |

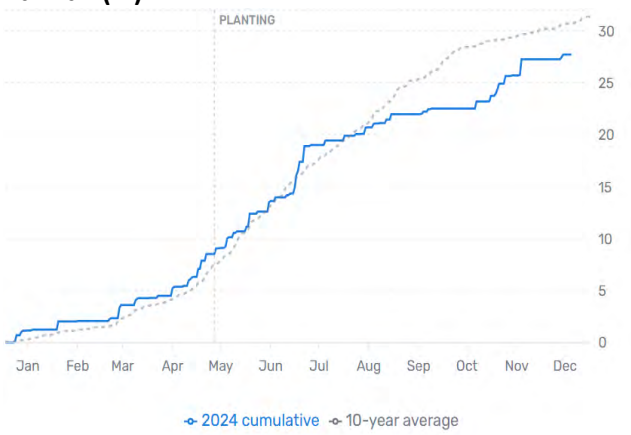
alues with the same letter are not significantly different at a 90% confidence level.
ushels per acre corrected to 15.5% moisture.
Marginal net return based on $5.91/bu corn, $0.78/lb N, $20/ac for Pivot Bio PROVEN® 40, $5/ac for Johnson-Su, and $27.50/ac for Liquid Pro Zn.

**ummary:** There were no differences in stand counts, moisture, test weight, yield, or net return between e treatments. The Johnson-Su Low treatment had higher stalk rot than the Pivot Bio PROVEN® 40 Low eatment.

# Corn Infurrow/Seed Treatment at Planting

**Study ID:** 1099185202402
**County:** York
**Soil Type:** Hastings silty clay loam
**Planting Date:** 5/11/24
**Harvest Date:** 8/21/24
**Population:** 33,000
**Row Spacing (in):** 30”
**Hybrid:** Channel® 214-22STX
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** No-Till
**Herbicides:** ***Pre:*** 2 pt/ac Surestart® +1 pt/ac atrazine + 32 oz/ac glyphosate ***Post:*** 32 oz/ac Liberty® + 2 qt/ac Lexar® + 3 lb/ac sugar
**Seed Treatment:** Company standard
**Foliar Insecticides:** 6.4 oz/ac bifenthrin + 3.8 oz/ac LambdaCy®
**Foliar Fungicides:** 14 oz/ac Quilt XL® + 2 qt/ac Fulvic Maxx® + 2 qt/ac Sweetneez®

**Fertilizer:** 15 gal/ac UAN 32%-0-0 on 5/11/24. 35 gal/ac UAN 32%-0-0 on 5/16/24.
**Note**: Corn fired lower leaves, suggesting a potential N shortage
**Irrigation:** Pivot, 6”
**Rainfall (in):**




**Introduction:** Selecting the appropriate starter fertilizer in corn can be challenging due to both agronomic and net return questions. This study tested 4 different starter treatments in corn, including BW Fusion™ Environoc 401®, AgroLiquid® Pro-Germinator, mycorrhizae, and an untreated check. Environoc 401® is an all-natural starter made up of 24 different microbes that can benefit plant and soil symbiotic relationship. AgroLiquid® Pro-Germinator® includes nitrogen, potassium, iron and phosphate phosphorus that can provide essential nutrients early in the season. This study included 4 replications of these different starters to test efficacy and see if there was an overall yield difference.

**Results:**

| Treatment | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| BW Fusion Environoc® 401 + Zinc | 15.57 A* | 248 A | 1,061 AB |
| Agro Liquid Pro-Germinator® + Zinc | 15.57 A | 242 A | 1,026 B |
| Untreated Check | 14.48 A | 246 A | 1,070 A |
| Mycorrhizae | 15.3 A | 247 A | 1,071 A |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, $15.50 for BW Fusion Environoc® 401 + Zinc, $25.7/ac for AgroLiquid® Pro-Germinator®, and $4/ac for Mycorrhizae.

**Summary:**

- There were no differences in moisture or yield between the treatments.
- However, the highest marginal net return was found in the untreated check ($1,070/ac) and mycorrhizae treatment ($1,071/ac).
- Selecting the correct starter fertilizer may depend on yield goals and soil health.

# Increasing Organic Matter in Non-Irrigated Cropping Systems

**Study ID:** 0720129202401
**County:** Nuckolls
**Soil Type:** Hastings silt loam 0-1% slope
**Planting Date:** /25/23
**Harvest Date:** 7/12/24
**Seeding Rate:** 90 lbs/ac
**Row Spacing (in):** 7.5”
**Variety:** WestBred® 4422
**Reps:** 4
**Previous Crop:** Corn silage
**Tillage:** No-till
**Herbicides:** ***Pre:*** Ally® XP
**Foliar Fungicides:** Trivapro®
**Fertilizer:** 85 lbs/ac N spring applied

**Irrigation:** None
**Rainfall (in):**


**Introduction:** The goal of this family farm is to increase organic matter on this non-irrigated field. This is Year 1 of a long-term study to determine the impacts of using biological products with and without the use of cover crops. Two other on-farm research studies (early season interseeded cover crops) showed an increase in organic matter with the use of a biological product with cover crops. This study seeks to test if the results can be repeated on this farm.

Four products were tested:

- Untreated Control
- H-Pro 20 at 2 qt/ac (H-Pro 20 is an organic acid containing humic and fulvic acids)
- WC814F bio stimulant at 8 oz/ac (WC814F is an experimental bio stimulant)
- PrairieFood™ at 15 gal/ac (PrairieFood™ is a soil amendment to feed soil microbes)

Winter wheat WestBred® 4422 was planted Sept. 25, 2023, at 90 lb/ac. Prior to top-dressing the wheat with fertilizer, the bio stimulant products were added to the plot at Feekes 5 on April 12, 2024. Haney and PLFA soil tests were compiled from the 4 reps of each treatment on April 17, 2024. Data is shown in Table 1. After wheat harvest, a multi-species cover crop was drilled into half of the plots at 43 lb/ac on July 22, 2024. The cover crop consisted of 23.16% BMR Sorghum Sudan, 14.01% Pearl Millet, 45.88% Cow Pea, and 14.91% Radish by weight. For the purposes of the yield results, the cover crop was not implemented until after wheat harvest and is not a factor in the yields.

**Photos:** (Left photo): Winter wheat on Oct. 23, 2023, and April 29, 2024 (Right photo).

**Table 1.** Haney (H20 and H3A Extracts) and Phospholipid Fatty Acid (PLFA) collected April 17, 2024 (0-6”).

| | pH | Buffer pH | OM LOI % | Nitrate-N ppm N | *Soil Resp. CO2-C ppm | *WEOC ppm | *%MAC | *WEON ppm | *SHC | Avail. N (lb/ac) | Avail. P (lb/ac) | Total Microbe Biomass ng/g | Total Bacterial Biomass ng/g | Total Fungal Biomass ng/g | Diversity Index |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Check NC | 5.7 | 6.2 | 2.8 | 4.3 | 116.7 | 197 | 59.1 | 12.7 | 14.95 | 37.2 | 53.5 | 1808.8 | 821.8 | 62.8 | 1.18 |
| H-Pro 20 NC | 5.7 | 6.3 | 3.0 | 4.3 | 104.8 | 178 | 59.0 | 12.3 | 13.52 | 36.2 | 46.3 | 1978.8 | 1064.5 | 102.8 | 1.26 |
| WC814F NC | 5.6 | 6.2 | 2.9 | 5.1 | 97.8 | 196 | 49.8 | 12.7 | 14.98 | 38.9 | 60.3 | 2191.7 | 1146.9 | 43.5 | 1.05 |
| Prairie Food NC | 5.6 | 6.2 | 2.9 | 3.8 | 107.8 | 192 | 56.0 | 12.4 | 14.07 | 35.4 | 47.7 | 2268.0 | 946.8 | 181.7 | 1.36 |
| Check CC | 5.6 | 6.2 | 2.7 | 5.5 | 109.4 | 203 | 53.8 | 13.0 | 14.48 | 43.0 | 67.0 | 1466.8 | 721.1 | 108.9 | 1.33 |
| H-Pro 20 CC | 5.6 | 6.3 | 3.0 | 4.8 | 109.0 | 172 | 63.3 | 11.4 | 13.66 | 39.4 | 57.0 | 3010.0 | 1442.1 | 219.3 | 1.34 |
| WC814F CC | 5.7 | 6.3 | 3.0 | 5.1 | 100.7 | 208 | 48.5 | 13.3 | 13.87 | 39.4 | 78.7 | 4631.9 | 2198.9 | 565.1 | 1.47 |
| Prairie Food CC | 5.7 | 6.3 | 2.7 | 4.9 | 91.6 | 210 | 43.6 | 13.3 | 14.70 | 40.1 | 65.1 | 1391.3 | 672.1 | 63.9 | 1.22 |

Terms from Regen AgLab:
*Soil Respiration is a measure of C02-C a soil can produce over a 24-hour incubation period following a significant drying and rewetting event. 71-100 is Above Average; 101-200 is High.
*WEOC (Water Extractable Organic Carbon) is a measure of the organic carbon or food most readily available to microbes.
*%MAC (Microbially active carbon) is how much of the WEOC pool was acted upon by the microbes measured as soil respiration. Ideal range between 50-75%.
*WEON (Water Extractable Organic Nitrogen) represents the pool of organic N that is available to the microbes. Often between 10-30 ppm.
*SHC is the soil health score, which is a summary of the soil respiration, WEOC and WEON measured by the Haney Test and represents the current health level of the soil based on these indicators. Would like to see this above 7 and rarely see this above 30.

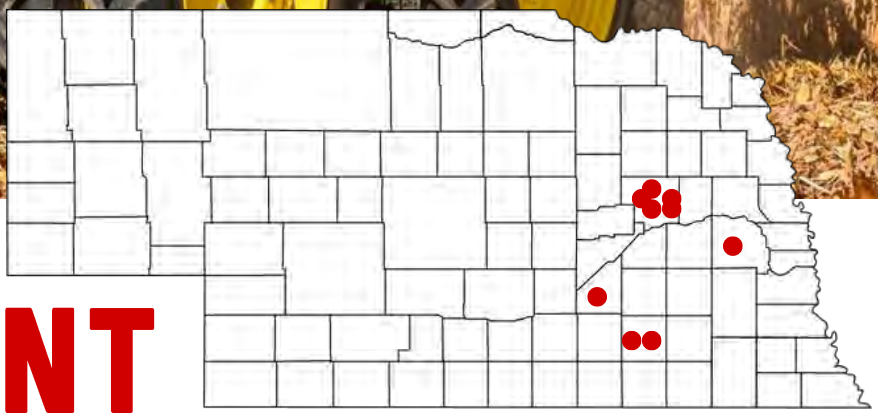
**Results:** The results show the four treatments used in 2024. Cover crops were planted after this wheat study was harvested and were not a factor in these yield results.

| | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|
| Untreated Check | 10.4 A | 98 A | 644 AB |
| H-Pro 20 | 10.1 A | 10 A | 663 A |
| WC814 experimental | 10.1 A | 100 A | 654 A |
| PrairieFood™ | 10.0 A | 99 A | 603 B |
| P-Value: | 0.27 | 0.69 | 0.02 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13.5% moisture.
‡Marginal net return based on $6.60/bu wheat, $48.75/ac Prairie Food, $6.00/ac H-Pro 20, $2/ac experimental (WC814).

**Summary:**

- There were no significant differences in moisture or yield between the treatments.
- There were significant differences in marginal net return, with 3 treatments having significantly higher net return than Prairie Food™, including the untreated check ($644/ac), H-Pro 20 ($663/ac) and WC814 experimental ($654/ac).
- The benefits of focusing on increasing organic matter and the usage of cover crops should be viewed as a long-term investment in the field.

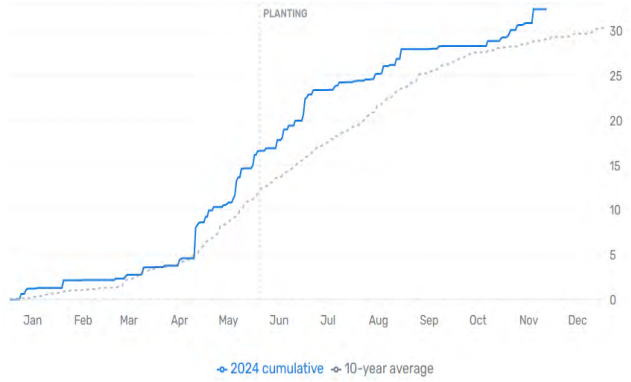


# EQUIPMENT

# Overseeding Cover Crops in Standing Popcorn

**Study ID:** 1522081202401
**County:** Hamilton
**Soil Type:** Hastings silt loam
**Planting Date:** 6/3/23
**Harvest Date:** 10/21/23
**Population:** 36,000
**Row Spacing (in):** 30”
**Hybrid:** Zangger® ZX62
**Reps:** 4
**Previous Crop:** Soybeans
**Tillage:** Spring disk, rotary hoe at preemergence, emergence and V1; cultivate at V3, cultivate at V5
**Herbicides:** ***Pre:*** None ***Post:*** None
**Seed Treatment:** None
**Foliar Insecticides:** None
**Foliar Fungicides:** None

**Fertilizer:**200 lb/ac Nature State® 13-0-0 applied 6/3/23 (at planting) 2" x 4" from row; 300lbs Chicken Cluck 4-3-2 at V2-V3 on 6/26/23 side dress 2" depth x 4" from row.
**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** This study compared different methods of improving interseeded cover crop establishment. The cover crop was interseeded into popcorn September 1 and included 60% Elbon Cereal Rye, 20% Austrian Winter Pea, 20% Hairy Vetch seeded at 23 lb/ac. The seed was dropped uniformly between all rows with treatment consisting of 1) a wheel running before of the seed was drop, 2) a wheel running after the seed drop, 3) a single 19 inch coulter angled 2 inches off center penetrating the soil about 1 inch, and 4) no soil or residue disturbance.

**Figure 1:** Photo of Cover Crop Interseeder

The applicator was a modified 3-wheel detasseling personal carrier equipped with John Deere insecticide boxes for each row to meter the seed, a 5’ by 3” in Lilliston cultivator pipe to attach the coulter (only on even number rows) with seed drop tubes with “Y” drops over the disk. On the odd number rows, the seed free fell from the boxes except in the wheel track rows which had a seed drop tube. The travel speed was about 3.5 mph. The weather was very dry after planting and thus the pivot applied 0.5” of water on September 7, 9, 12, 14, and 19, with rain on September 10 (0.30”) and 22 (1”), and October 3 (0.70”).

Stand counts were taken in each treatment in 10 ft row-length measurements (four 30’ X 30” areas approximitely 30 feet apart and added together). The stand counts were done by counting the number of each species within the 10 ft row-length. Statistical analysis was conducted by analyzing each species seperately with respect to the equipment method, and then once again by adding total stand count with respect to each equipment method.

**Results:**

| | Rye (plants/10ft) | Vetch (plants/10ft) | Winter Pea (plants/10ft) | Mix (total plants/10ft) |
|---|---|---|---|---|
| Front Wheel | 3.4 AB* | 3.2 A | 0.7 A | 7.2 A |
| Back Wheel | 3.9 A | 2.2 A | 0.4 AB | 7.2 A |
| Coulter disk | 3.1 AB | 2.2 A | 0.4 AB | 5.6 AB |
| No disk, no wheel | 1.7 B | 1.5 A | 0.08 B | 3.8 B |
| P-Value | 0.1 | 0.32 | 0.07 | 0.08 |

*Values with the same letter are not significantly different at a 90% confidence level.

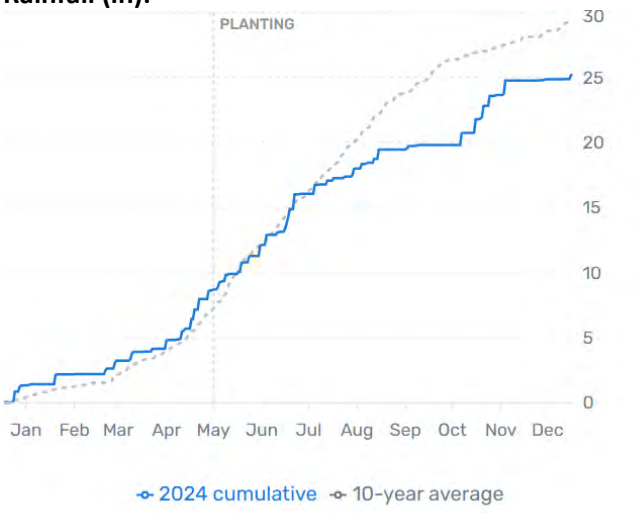
**Summary:**

- Significant differences were found in rye stand count when using either a front wheel (3.4 plants/ 10ft), back wheel (3.9 plants/ 10ft), or a coulter disk (3.1 plants/ 10ft) when compared against no disk, no wheel (1.7 plants/ 10ft).
- In vetch, all equipment methods had similar stand counts (1.5-3.2 plants/ 10ft).
- Significant differences were also found in winter pea, as using no disk, no wheel (0.08 plants/ 10ft) resulted in lower than other equipment methods.
- When combining total stand count, using either a front or back wheel (7.2 plants/ 10ft) or coulter disk (5.6 plants/ 10ft) was significantly higher than no disk no wheel (3.8 plants/ 10ft).
- Further research should be conducted in this category. With an increasing focus on cover crops, germination in response to equipment methods and seed should be a focus moving forward.

# Planting Downforce Rates in Corn

**Study ID:** 1546059202401
**County:** Fillmore
**Soil Type:** Crete silt loam 0-1% slope
**Planting Date:** 5/15/24
**Harvest Date:** 10/28/24
**Population:** 32,000
**Row Spacing (in):** 30”
**Hybrid:** Stine® 9709-0
**Reps:** 4
**Previous Crop:** Soybean
**Tillage:** No-till
**Herbicides: Burndown*:*** Roundup PowerMAX®, AAtrex®4L, and Detonate® on 4/24/24 ***Post:*** DiFlexx® applied on 6/18/24
**Seed Treatment:** Company standard
**Foliar Insecticides & Fungicides:** None

**Fertilizer:** 100-150 lb/ac 11-52-0 variable rate applied in March. 150 lb N/ac UAN applied in late June.
**Irrigation:** Pivot Total: 8”
**Rainfall (in):**




**Introduction:** This grower had purchased Ag Leader’s hydraulic downforce system across the planter in hopes of reducing the wear and tear on his planter and better adjust for varying planting conditions. For this study, the grower used a low (40 lb pressure/row unit), medium (95 lb pressure/row unit), and high (200 lb pressure/row unit) downforce pressure during planting. The study design was a randomized complete block with 4 replications.

The goal was to take emergence counts each day to account for any differences observed in emergence for the different pressures. The low downforce had better emergence the first two days; however, by day 4 of emergence, the corn in all downforce treatments showed similar stand counts (Figure 1). The final emergence counts in the low and medium downforce treatments (34,000 plants/ac) were greater than the original plant stand the grower was aiming for (32,000 plants/ac).

A windstorm shortly after the DiFlexx® application resulted in corn leaning and goosenecking, impacting yields throughout the field. The leaned/goosenecked plants also made walking in the field difficult and harvest stand counts were not taken because of this.

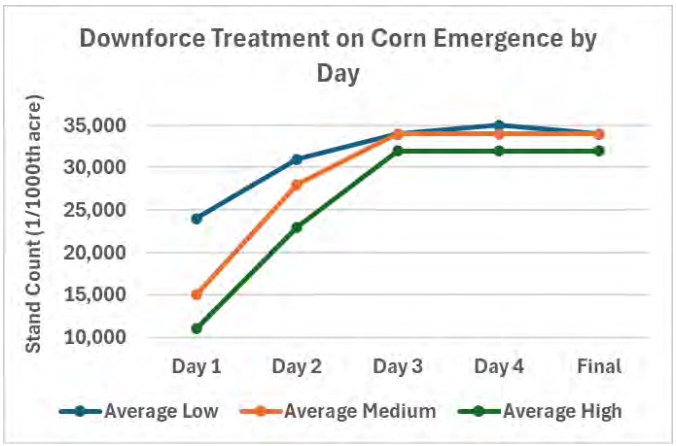



**Figure 1:** Emergence count by day (day 1 is first corn emergence)

**Results:**

| | Emergence Counts (plants/acre) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Low | 34,000 A* | 11.5 A | 208 A | 905 A |
| Medium | 34,000 A | 11.5 A | 209 A | 908 A |
| High | 32,000 A | 11.5 A | 205 A | 892 A |
| P-Value: | 0.23 | 0.84 | 0.46 | 0.46 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn.

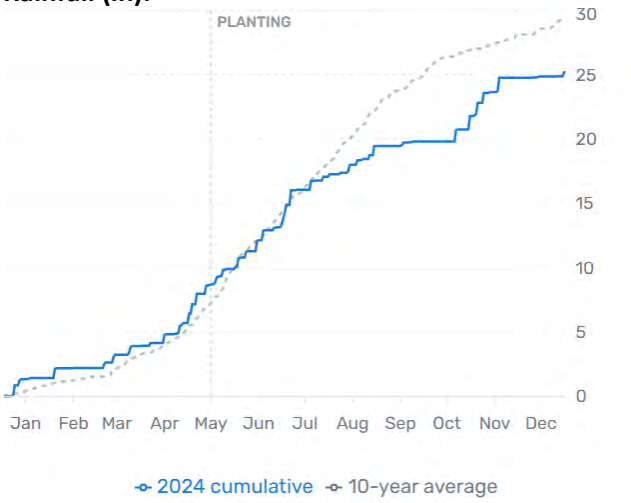
**Summary:**

- There were no significant differences in emergence counts or moisture.
- There were no significant differences in yield and marginal net return.
- The grower plans to test the downforce study again next year.

# Planting Downforce Rates in Soybean

**Study ID:** 1546059202401
**County:** Fillmore
**Soil Type:** Crete silt loam 0-1% slope
**Planting Date:** 5/15/24
**Harvest Date:** 10/17/24
**Population:** 130,000
**Row Spacing (in):** 30”
**Variety:** Stine® 29EF02
**Reps:** 4
**Previous Crop:** Corn
**Tillage:** No-till
**Herbicides:** ***Pre:*** Roundup PowerMAX® 3 + Lovol® #6 + Tricor® 4F applied 4/19/24. ***Post:*** Enlist One® + Warrant® + Surmise® applied 6/7/24. RoundUp PowerMAX® + Enlist One® + Fusilade® + Warrant® + Liberty® (respray) applied 6/26/24.
**Seed Treatment:** None
**Foliar Insecticides & Fungicides:** None

**Fertilizer:** 100-150 lb/ac 11-52-0 variable rate applied in March.
**Irrigation:** Pivot, Total: 8”
**Rainfall (in):**




**Introduction:** This grower had purchased Ag Leader’s hydraulic downforce system across the planter in hopes of reducing the wear and tear on his planter and better adjust for varying planting conditions. For this study, the grower used a low (40 lb pressure/row unit), medium (95 lb pressure/row unit), and high (200 lb pressure/row unit) downforce pressure during planting. The study design was a randomized complete block with 4 replications.

The goal was to take emergence counts each day to account for any differences observed in emergence for the different pressures. The high downforce had better emergence the first two days; however, by Day 5 of emergence, the soybeans in all downforce treatments showed similar stand counts.

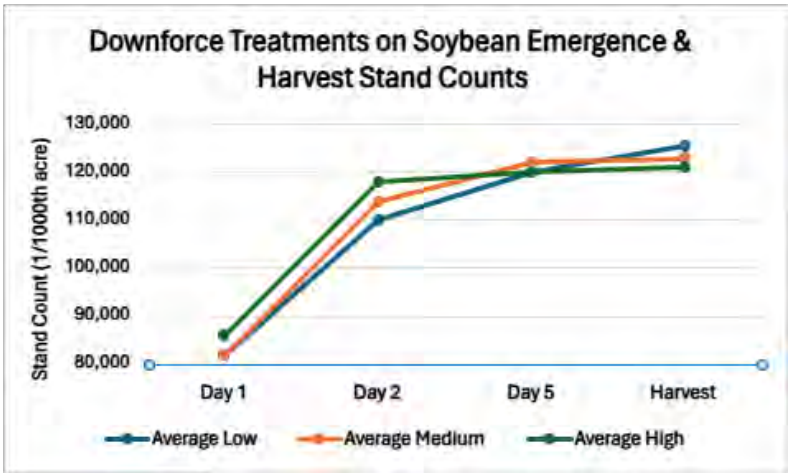



**Figure 1:** Downforce Treatment of Soybean Emergence by Day

**Results:**

| | Stand Counts (plants/ac) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| 40 lbs/ row unit | 125,500 A* | 8.9 A | 78 A | 862 A |
| 95 lbs/ row unit | 123,000 A | 8.9 A | 77 A | 846 A |
| 200 lbs/ row unit | 121,000 A | 9.1 A | 77 A | 848 A |
| P-Value: | 0.92 | 0.28 | 0.35 | 0.35 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans. Cost of hydraulic downforce was not factored in.

**Summary:**

- There were no significant differences in stand counts, moisture, yield, or marginal net return among the treatments evaluated.
- The amount of downforce required may depend on tillage and spring conditions. Further testing should be conducted in various scenarios.

# Comparing John Deere Planters at Varying Speeds

**Study ID:** 0928155202401
**County:** Saunders
**Soil Type:** Yutan silty clay loam; Filbert silt loam
**Planting Date:** 4/23/24
**Harvest Date:** 9/17/24
**Population:** 32,000
**Row Spacing (in):** 30
**Hybrid:** DEKALB® DKC66-18
**Reps:** 5
**Previous Crop:** Soybean
**Tillage:** No-till
**Herbicides:** ***Pre:*** 17.4 oz/ac Verdict® + 7.8 oz/ac DiFlexx® + 21.3 oz/ac glyphosate ***Post:*** 2.9 oz/ac Laudis® + 31 oz/ac atrazine + 21.4 oz/ac glyphosate
**Seed Treatment:** Standard seed treatment
**Foliar Insecticides:** None
**Foliar Fungicides:** None
**Fertilizer:** Pre-plant 170 lb/ac NH3
**Irrigation:** Pivot
**Rainfall (in):**


**Introduction:** With technological advances, planter units are capable of accurately metering and delivering seed to the furrow at faster planting speeds. Using this higher speed, a farming operation would be able to plant more acres per day versus going to a wider planter. However, this can lead to uneven planting depth and emergence if downforce is not able to keep up with the increased speed.

This is the first year of this study, which compares the farm standard John Deere® 1795 MaxEmerge™ planter with pneumatic down pressure and pin adjust row cleaners to a John Deere® 1775NT ExactEmerge™ planter with hydraulic down pressure, pneumatic row cleaners, and frame weight distribution to study if faster planting speeds are possible when using a brush belt delivery system and an active down pressure system. The MaxEmerge™ planter was run at the farm standard planting speed of 5 mph and 7.5 mph, while the ExactEmerge™ planter was run at 5 mph, 7.5 mph, and 10 mph. A gap of 200 feet was included between treatments to allow time for the tractor and planter to speed up or slow down to the targeted speed (Figure 1). Due to available equipment, the ExactEmerge™ plots consisted of two 24 row planter passes, while the MaxEmerge™ plots consisted of three 16 row planter passes. Five replications of each treatment were run.


**Figure 1.** Plot layout showing replications.

The study evaluated the impact of the planter and speed on early season stand counts, coefficient of variation, harvest ear counts, moisture, yield, and marginal net return. Early season and harvest counts were conducted by flagging areas so the same distance of 17 feet 5 inches was evaluated both times, with 8 counts taken per rep. Additionally, stands were evaluated early in the season by measuring the distance between individual emerged plants for a distance of 17 feet 5 inches, with 4 counts taken per rep. This was then analyzed with a stand count calculator to identify skips, doubles, average plant spacing and coefficient of variation. Coefficient of variation equal to zero means that the plants are equally spaced. Yield and moisture were calculated by cleaning the yield map collected with a calibrated yield monitor.

**Results:**

| Planter Equipment and Speed | Early Season Stand Count (plants/acre) | Late Season Ear Count (ears/acre) | Plant Spacing CV (in/in) | Potential Skips (plants/acre) | Potential Doubles (plants/acre) |
|---|---|---|---|---|---|
| MaxEmerge™ 5 mph | 32,100 A* | 30,425 A | 0.29 A | 303 A | 253 A |
| MaxEmerge™ 7.5 mph | 31,075 AB | 30,475 A | 0.46 B | 1215 B | 1923 B |
| ExactEmerge™ 5 mph | 30,975 B | 29,400 A | 0.28 A | 507 A | 0 |
| ExactEmerge™ 7.5 mph | 31,050 B | 29,425 A | 0.32 A | 352 A | 406 A |
| ExactEmerge™ 10 mph | 30,600 B | 29,950 A | 0.33 A | 703 AB | 302 A |
| P-Value | 0.017 | 0.3 | 0.002 | <0.001 | 0.002 |

*Values with the same letter are not significantly different at a 90% confidence level

| Planter Equipment and Speed | Moisture (%) | Yield (bu/ac)† |
|---|---|---|
| MaxEmerge™ 5 mph | 29.1 A | 226 A |
| MaxEmerge™ 7.5 mph | 29.1 A | 221 A |
| ExactEmerge™ 5 mph | 29.6 A | 221 A |
| ExactEmerge™ 7.5 mph | 29.0 A | 224 A |
| ExactEmerge™ 10 mph | 29.6 A | 226 A |
| P-Value | 0.99 | 0.52 |

The stand count calculator histograms (Figure 2) show the range in spacing for each planter and speed. The black line indicates the desired spacing, with the red bars indicating the percentage of plants that had spacings ranging from 0 inches to over 20 inches.

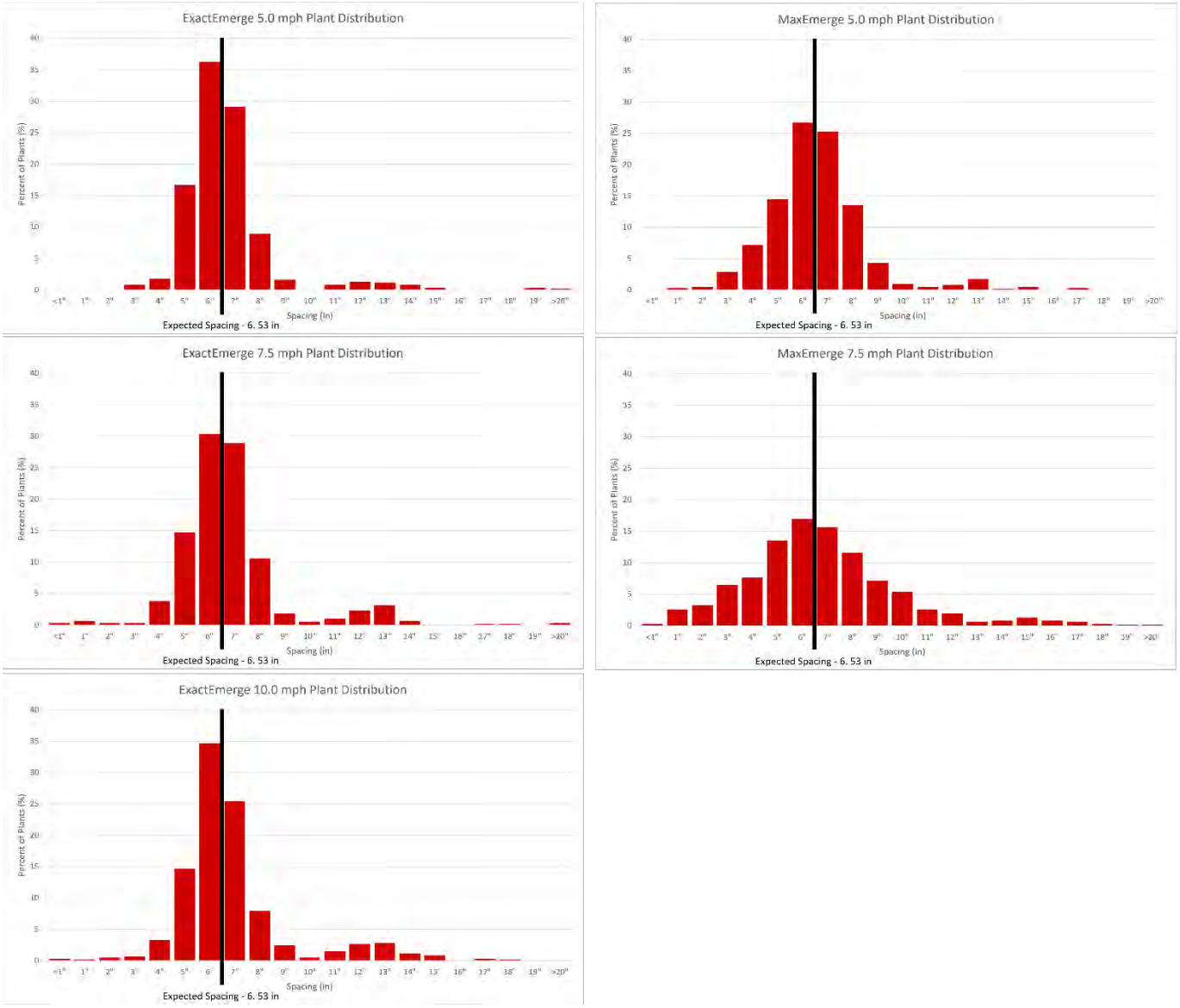


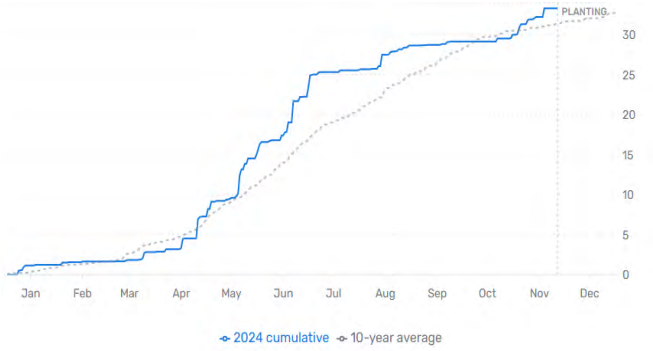

**Figure 2.** Histograms of spacing by planter type and speed. The black line indicates the desired spacing.

**Summary:**

- There were significant differences in early season stand counts, plant spacing CV, potential skips and doubles for the two planters and three speeds evaluated.
- There were no significant differences in ear counts, grain moisture, or yield for the two planters and three planting speeds evaluated.
- Net return was not calculated for the study as it depends on cost to upgrade to a new planter, as well as the revenue potential if increased planting speed allows for better timeliness of planting and labor savings.

# Replacement of Sprinkler Package of a Center Pivot

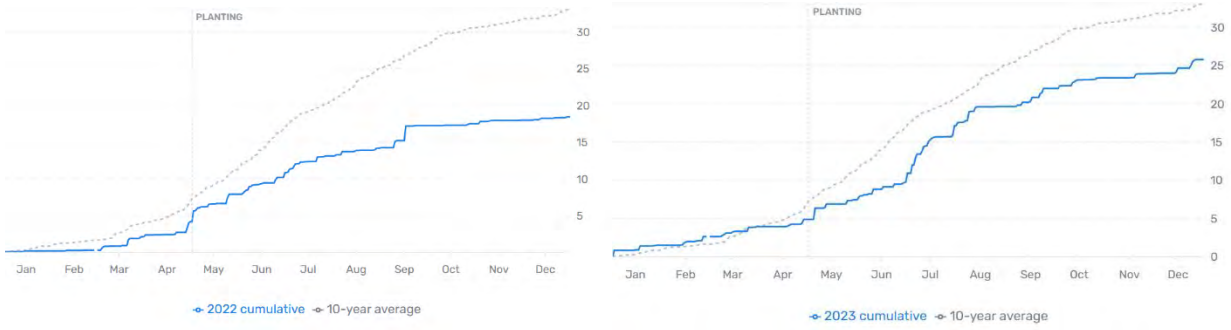
**Study ID:** 0085141202404
**County:** Platte
**Soil Type:** Boel loamy fine sand; 0-2% slopes
**Planting Date:** 5/13/24
**Harvest Date:** 9/27/24
**Population:** 34,000
**Row Spacing (in):** 30
**Hybrid:** DEKALB® DKC 63-90, 108-64
**Reps:** 4
**Previous Crop:** Soybean
**Tillage:** No-till
**Herbicides:** ***Pre:*** 64 oz/ac Degree Xtra® + 3 oz/ac Balance Flex® + 6 oz/ac Sterling Blue®+ 28 oz/ac Roundup PowerMAX® ***Post:*** 24 oz/ac glyphosate + 12 oz/ac DiFlexx®. 43 oz/ac Liberty®
**Seed Treatment:** Acceleron®
**Foliar Insecticides:** None
**Foliar Fungicides:** Delaro® 4 oz/ac
**Fertilizer:** Preplant: 225 lb Poly4; Planting: 5 gal (6-24-6-1ZN) with 1 pt of micronutrients in furrow, 8 gal of 32%-0-0 + 2 gal ATS dribbled on top; Sidedress: 30 gal 90/10 mix of 32% UAN and ATS
**Note**: Cereal rye was planted following the previous harvest on 10/20/23 at 50 lb/ac and was chemically terminated before 2024 planting
**Irrigation:** Pivot
**Rainfall (2024) (in):**




**Introduction:** This study evaluated the impact of a sprinkler package replacement on the third pivot span on crop yield. In this particular center pivot, the grower noticed lower than expected yield values when looking at the yield monitor data for the past two years. The issues were mainly found in spans 1-3, with the last two spans (4 and 5) presenting no issues.

All the sprinklers on the third span were replaced on July 24 just before the first irrigation on the same date. All pivot plugs were replaced with a set of Komet Precision Regulator Komet KPR-X® at 10 psi and a Komet KPT-Peak® Precision Twister Sprinkler. Yield averages from the past two growing seasons (2022 and 2023) were compared with the 2024 growing season for the treatments assigned below:
Treatment 1 (Check) – Span 1-2, original sprinklers, bad spot (red)
Treatment 2 – Span 3, new sprinklers replaced in 2024 (yellow)
Treatment 3 – Span 4-5, original sprinklers, good spot (green)


**Figure 1:** Project Design and Layout




**Figures 2:** Rainfall amounts in 2022 (left) and 2023 (right).

**Results:**

| | 2022 yield (Corn)(bu/ac) | 2022 Marginal Net Return ‡ ($/ac) | 2023 yield (soybean) (bu/ac) | 2023 Marginal Net Return ‡ ($/ac) | 2024 yield (Corn)(bu /ac) | 2024 Marginal Net Return ‡ ($/ac) |
|---|---|---|---|---|---|---|
| Treatment 3 (span 4-5) | 228 A* | 999 A | 83 A | 912 A | 241 A | 1,407 A |
| Treatment 2 (span 3) | 183 C | 799 C | 75 B | 828 B | 239 A | 1,036 A |
| Treatment 1 (span 1-2) | 195 B | 849 B | 76 B | 839 B | 237 A | 1,030 A |
| P-Value: | <0.001 | <0.001 | 0.003 | 0.003 | 0.52 | 0.51 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture for corn, and 13% for soybeans.
‡Marginal net return based on $4.30/bu corn (uniform price all years), $11/bu soybeans (uniform price all years).

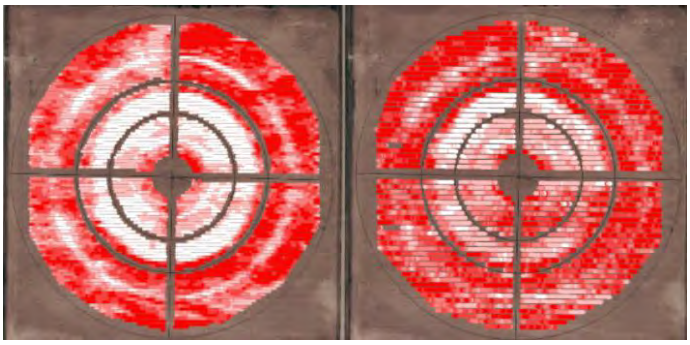


**Figure 3:** Yield map in 2022 (Year 1, corn) and 2023 (Year 2, soybeans).

**Summary:**

- For the 2022 and 2023 growing seasons, yield and net marginal net return were statistically lower from spans 1-2 (treatment 1 - check) and span 3 (treatment 2) in comparison with spans 4-5 (treatment 3). The average loss from spans 1-3 considering both growing seasons was $126.90/ac compared with span 4-5.
- In 2024, although new sprinklers on span 3 resulted in similar yield and net return compared with spans 4-5 (good spots with original sprinklers), spans number 1-2 equipped with original sprinklers also resulted in similar values.
- This field is near the Platte River with a light-textured soil type and it experienced abundant spring and early summer rainfall. This resulted in a high-water table during the entire 2024 growing season and, unfortunately, masked the results.
- The same study will be conducted in 2025 with the objective of identifying the potential yield gain when replacing the sprinkler package of center pivots.

# Test of Irrigation Scheduling Tools in Corn

**Study ID:** 1543141202501
**County:** Platte
**Soil Type:** Ovina loamy fine sand
**Planting Date:** 5/12/24
**Harvest Date:** 10/19/24
**Population:** 32,000
**Row Spacing (in):** 30”
**Hybrid:** DEKALB® DKC62-69, Wyffels™ 6826
**Reps:** 6
**Previous Crop:** Corn
**Tillage:** Conventional till
**Seed Treatment:** Company standard

**Irrigation:** Pivot, Total: Varied
**Rainfall (in):**


**Introduction:** This study evaluated the use of Aluvio™ (https://aluvio.us/) as an irrigation scheduling tool on corn. A center pivot equipped with a FieldNET system by Lindsay ™ allowed for different irrigation rates applied in each irrigation event based on a speed control variable rate irrigation. A total of 180 degrees angle of the center pivot was used in this experiment (Figure 1). Whenever the grower decided to irrigate or Aluvio™ recommended an irrigation, an irrigation prescription map was uploaded in the FieldNET system and irrigation started.

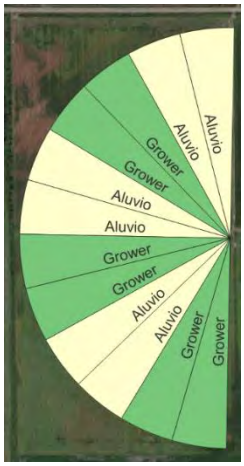



**Figure 1**: Project Design and Layout

**Results:**

| | Total Irrigation (in) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Grower’s Decision | 5.80 | 11.8 A* | 168 A | 723 A |
| Aluvio™ | 4.05 | 11.9 A | 168 A | 722 A |
| P-Value: | - | 0.89 | 0.96 | 0.74 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.30/bu corn, $8/ac cost for Aluvio™ technology, and $6/ac-in irrigation water applied.

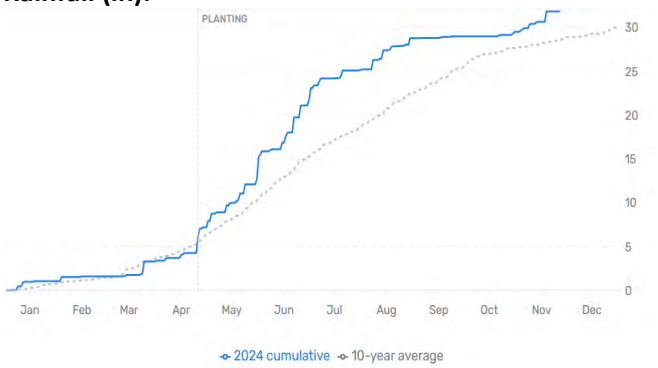
**Summary:**

- There were no significant differences in moisture, yield, or marginal net return between the treatments.
- Although they were not statistically the same, the total irrigation water applied was 1.8 in lower when using Aluvio™ system.
- It suggests that there is an opportunity for irrigation water savings while sustaining crop yield, mainly in years like 2024 in which spring rainfall was abundant.

# Test of Two Irrigation Scheduling Tools in Corn

**Study ID:** 1315141202401
**County:** Platte
**Soil Type:** Moody silty clay loam 0-2% slope
**Planting Date:** 4/25/24
**Harvest Date:** 9/24/24
**Population:** 33,500
**Row Spacing (in):** 30”
**Hybrid:** Channel® 212-02
**Reps:** 6
**Previous Crop:** Soybean
**Herbicides:** ***Pre:*** Harness Xtra® + dicamba + Roundup PowerMAX® + Callisto® ***Post:*** n/a
**Seed Treatment:** Company standard
**Foliar Insecticides:** n/a
**Foliar Fungicides:** VT- Capture® + 7.5 gal/ac micro pak. July 5: 7.5 gal/ac azoxy

**Fertilizer:** Fall: NH3 110 lb N/ac. Preplant: 4.75 gal/ac (10-34-0). Sidedress: 31 gal/ac (24-0-0-10)
**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** This study evaluated the use of Aluvio™ (https://aluvio.us/) and Phytech™ (https://www.phytech.com/) as irrigation scheduling tools on corn. Note that this grower has been using the Phytech™ technology for many years to support his irrigation decisions. A center pivot equipped with a FieldNET system by Lindsay™ allowed for different irrigation rates applied in each irrigation event based on a speed control variable rate irrigation. A total of 180 degrees angle of the center pivot was used in this experiment (Figure 1). Whenever the grower decided to irrigate based on when the Phytech™ or Aluvio™ system was recommending irrigation, an irrigation prescription map was uploaded in the FieldNET system and irrigation started.

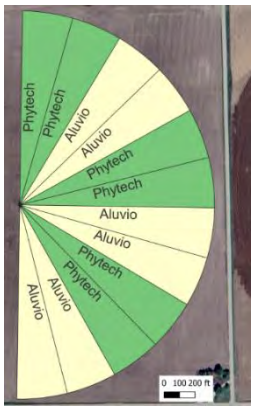



**Figure 1**: Project Design and Layout

**Results:**

| | Total irrigation (in) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Phytech™ (grower’s decision) | 5.50 | 20.7 A* | 327 A | 1,408 A |
| Aluvio™ | 4.25 | 20.5 A | 323 A | 1,400 A |
| P-Value: | - | 0.85 | 0.70 | 0.95 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, $8/ac cost for Aluvio™ technology, $6.15/ac cost for Phytech™ technology, and $6/ac-in water applied.

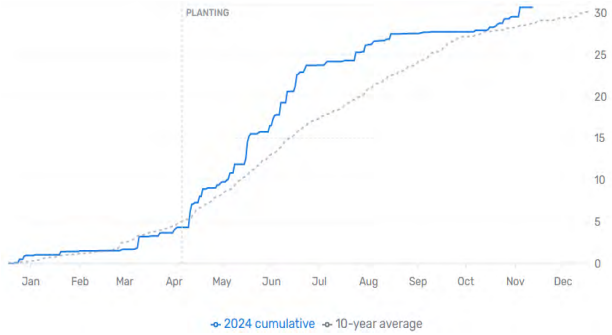
**Summary:**

- There were no significant differences between moisture, yield, or marginal net return between treatments.
- The total irrigation water amount was 1.25” lower when using Aluvio™ system in comparison with Phytech™.

# Test of Two Irrigation Scheduling Tools in Soybeans

**Study ID:** 1315141202403
**County:** Platte
**Soil Type:** Nora-Crofton complex
**Harvest Date:** 10/5/24
**Population:** 127,000
**Row Spacing (in):** 30”
**Variety:** Channel® 3124RXF, Pioneer® 28A42
**Reps:** 6
**Previous Crop:** Corn
**Tillage:** Strip-till
**Herbicides:** ***Pre:*** glyphosate + dicamba ***Post:*** glyphosate + Engenia®

**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** This study (with the east field) evaluated the use of Aluvio™ (https://aluvio.us/) and Phytech™ (https://www.phytech.com/) as irrigation scheduling tools for soybeans. Note that this grower has been using the Phytech™ technology for many years to support his irrigation decisions. A center pivot equipped with a FieldNET system by Lindsay™ allowed for different irrigation rates applied in each irrigation event based on a speed control variable rate irrigation. A total of 180 degrees angle of the center pivot was used in this experiment.

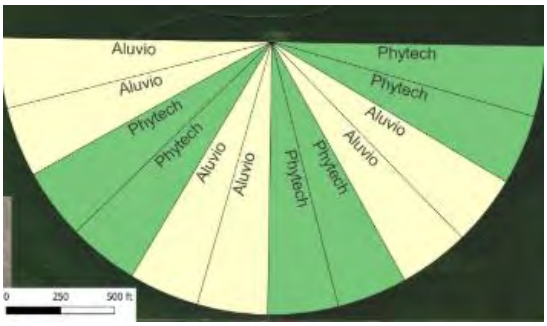



**Figure 1:** Project Layout and Design

Whenever the grower decided to irrigate based on when the Phytech™ or Aluvio™ system was recommending irrigation, an irrigation prescription map was uploaded in the FieldNET system and irrigation started.

**Results:**

| | Total Irrigation (in) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Phytech™ (grower’s decision) | 4.80 | 8.3 A* | 86 A | 933 A |
| Aluvio™ | 3.50 | 8.7 A | 87 A | 941 A |
| P-Value: | - | 0.15 | 0.87 | 0.9 |

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $11/bu soybeans, $8/ac cost for Aluvio™ technology, $6.15/ac cost for Phytech™ technology, and $6/ac-in water applied.

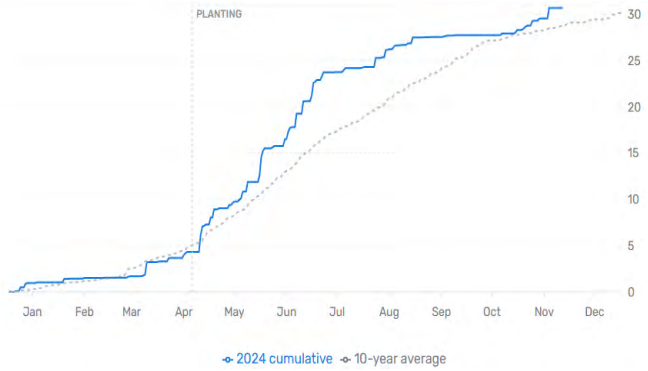
**Summary:**

- There were no significant differences for moisture, yield, or marginal net return between treatments.
- The total irrigation water applied was 1.3 in lower when using Aluvio™ system in comparison with Phytech™.

# Test of Two Irrigation Scheduling Tools in Soybeans

**Study ID:** 1315141202402
**County:** Platte
**Soil Type:** Nora-Crofton complex
**Harvest Date:** 10/5/24
**Population:** 127,000
**Row Spacing (in):** 30”
**Variety:** Channel® 3124RXF, Pioneer® 28A42
**Reps:** 6
**Previous Crop:** Corn
**Tillage:** Strip-till
**Herbicides:** ***Pre:*** glyphosate + dicamba ***Post:*** glyphosate + Engenia®

**Irrigation:** Pivot
**Rainfall (in):**




**Introduction:** This study evaluated the use of Aluvio™ (https://aluvio.us/) and Phytech™ (https://www.phytech.com/) as irrigation scheduling tools for soybeans. Note that this grower has been using the Phytech™ technology for many years to support his irrigation decisions. A center pivot equipped with a FieldNET system by Lindsay™ allowed for different irrigation rates applied in each irrigation event based on a speed control variable rate irrigation. A total of 180 degrees angle of the center pivot was used in this experiment.

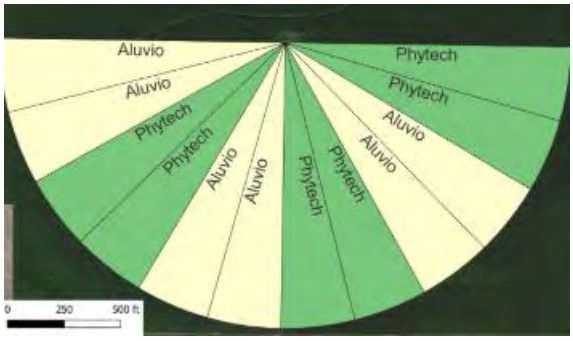


**Figure 1:** Project Design and Layout

Whenever the grower decided to irrigate based on when the Phytech™ or Aluvio™ system was recommending irrigation, an irrigation prescription map was uploaded in the FieldNET system and irrigation started.

**Results:**

| | Total Irrigation (in) | Moisture (%) | Yield (bu/ac)† | Marginal Net Return‡ ($/ac) |
|---|---|---|---|---|
| Phytech™ (grower’s decision) | 4.80 | 8.3 A* | 93 A | 1,001 A |
| Aluvio™ | 4.35 | 8.4 A | 91 A | 989 A |
| P-Value: | | 0.1 | 0.34 | 0.23 |

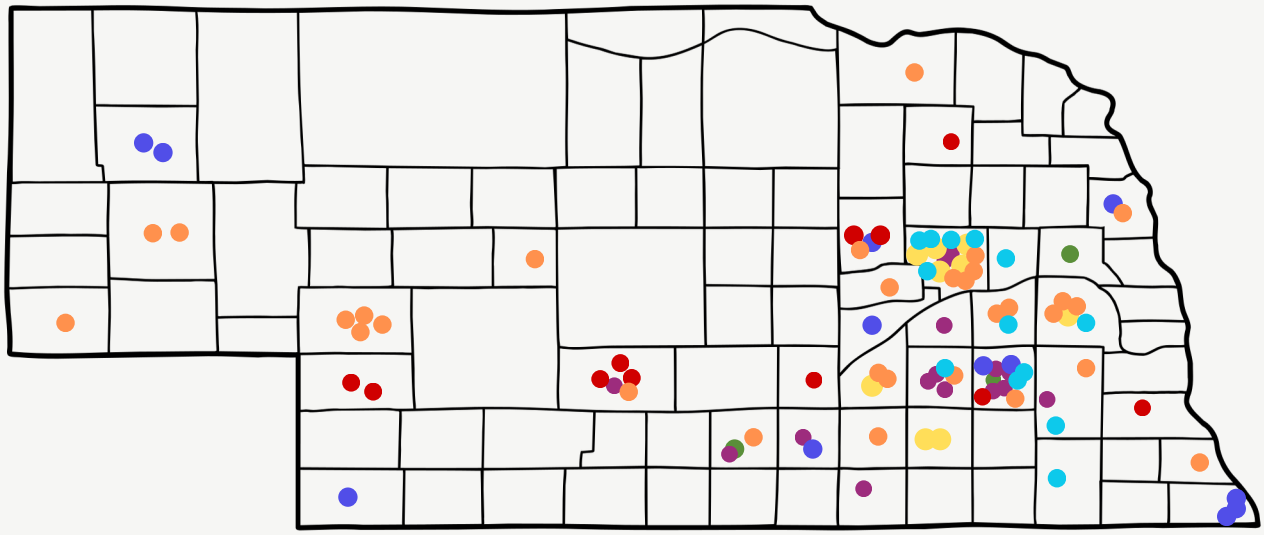
*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡ Marginal net return based on $11/bu soybeans, $8/ac cost for Aluvio™ technology, $6.15/ac cost for Phytech™ technology, and $6/ac-in water applied.

**Summary:**

- Irrigation scheduling decisions using Aluvio™ system resulted in similar yield and marginal net return when compared to the grower’s decision using Phytech™ system.
- The total irrigation water applied was only 0.45 in lower when using Aluvio™.

# NEBRASKA ON-FARM RESEARCH NETWORK

***Working with Nebraska's producers to address critical production, profitability, and natural resource questions***



## *2024 Studies*

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- Crop Production
- Fertility & Soil Management
- Non-Traditional
- Equipment
- HICCIP
- Crop Protection

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NEBRASKA SOYBEAN BOARD

Nebraska Dry Bean Commission

Nebraska CornGrowers ASSOCIATION