Plot2 Farm

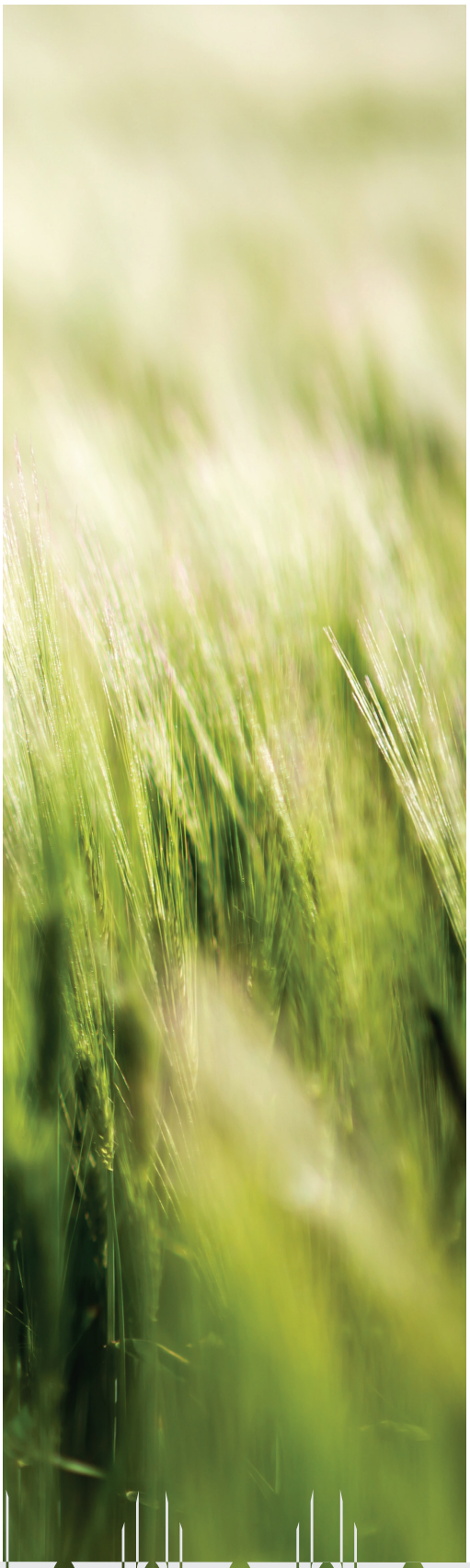
2022

PLOT2FARM TRIAL RESULTS

An on-farm research trial program supported by the Alberta Wheat and Alberta Barley Commissions

Alberta Wheat COMMISSION

Alberta Barley



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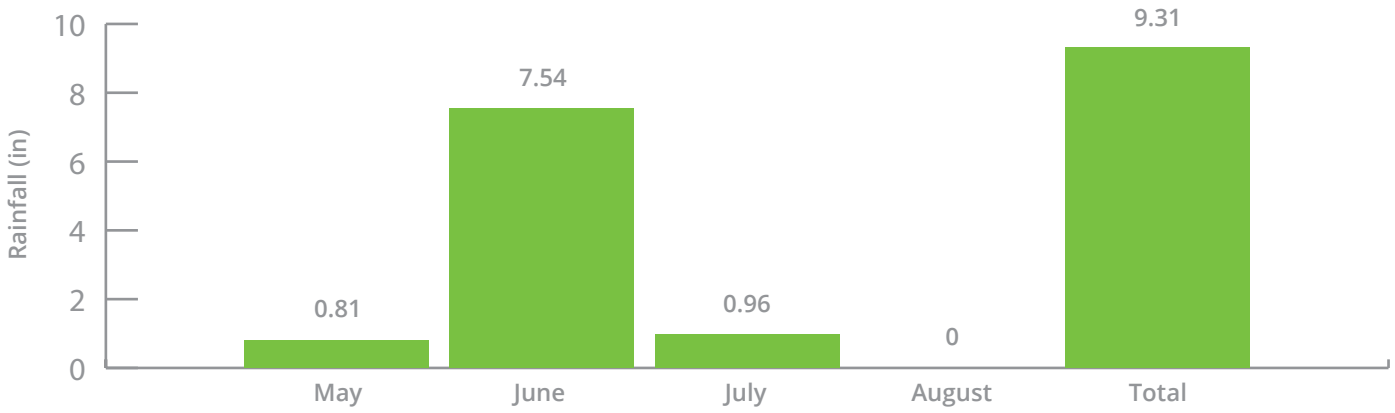
Seeding Rate Trials

Increasing seeding rates in barley (Mountain View)

Closest Town: Carstairs, Alberta
Soil type: Medium textured Orthic Black Chernozem
Seeding Date: May 26, 2022
Harvest Date: Swathed Aug 30, combined Sept 5, 2022
Row Spacing: 25.4 cm (10"), 3" paired row
Variety(s): CDC Austenson
Reps: Four
Previous Crop: Canola
Tillage: Fall harrow

Herbicides: Pre: Priority® + Roundup®
In-Crop: Axial® + Infinity® FX + AMS
Seed Treatment: Vibrance® Quattro
Foliar Insecticides: None
Foliar Fungicides: Miravas® Neo
Fertilizer: 59N-26P-7.6K lbs nutrient/ac
Irrigation: None

Rainfall (in) at trial location from May through August, 2022



Introduction

Partnering with Triple H Farms in Carstairs, Alberta, this trial compared three different seeding rates on the barley variety CDC Austenson. The trial was seeded using a 60-ft wide drill with 10" row spacings and 3" openers. Seeding rates to target plant stand treatments were determined using thousand kernel weight, germination percentage and farm specific emergence mortality estimates. Seeding rates to attain the treatment target plant stands of 22 (treatment 1), 27.5 (treatment 2) and 33 plants/ft^2 (treatment 3) were 76.7, 95.9, and 115 lbs of seed per acre, respectively. The seed thousand kernel weight was 33g. Treatments were replicated and randomized.

Treatments

Trial design goal

To determine the yield and grain quality impacts of seeding rates on barley.

Treatment 1: Target 22 plants/ft^2

Treatment 2: Target 27.5 plants/ft^2

Treatment 3: Target 33 plants/ft^2

Results

In-crop assessment results

Although seeding rates were adjusted to achieve target protocol plant stands, treatments 1 and 2 had the same plant stand counts 21 days after seeding. However, treatment 3 was significantly higher than both treatment 1 and 2 (Table 1).

Emergence percentage across the entire trial was 94.0%

Yield results

No significant yield differences were seen between target plant stand treatments (Table 1).

Table 1: Plant stand counts, yield, and quality results comparing three target plant stands (22 plants/ft^2, 27.5 plants/ft^2, and 33 plants/ft^2) on the barley variety CDC Austenson, in Carstairs, Alberta, 2022.

Target plant stand	Plant stand count at 21 days after seeding (plants/ft^2)	Yield at 13.5% seed moisture content (bu ac^{-1})	Protein (%)	Thins (%)	Test weight (lb/bu)	Plump (%)
Target 22 plants/ft^2	**25.1 a**	91.1 a	10.7 a	**1.7 a**	57.7 a	**90.6 a**
Target 27.5 plants/ft^2	**24.1 a**	90.3 a	10.4 a	**2.0 a**	58.0 a	**89.2 ab**
Target 33 plants/ft^2	**35.1 b**	90.7 a	10.4 a	**2.5 b**	57.9 a	**89.8 b**
***p*-value**	*0.0137*	*0.969*	*0.4408*	*0.0039*	*0.0734*	*0.0184*
CV%	26.89%	3.23%	2.54%	19.02%	0.69%	1.65%

Values with the same letter within a column are not significantly different. Significant difference if p≤0.05.

Grain quality results

Thin kernels were significantly higher in the highest seeding rate treatment. No plump differences were seen between the middle seeding rate and the lowest or highest seeding rates. Plump in the lowest seeding rate was significantly higher compared to the lowest seeding rate. However, the difference is likely not large enough to impact economic return. No significant differences in grain protein, chitting, greens, or were observed. Significant differences were seen for plump with treatment 1 displaying the lowest plump percentage (Table 1).

Economics

Table 2: Economic comparison of different seeding rates (22 plants/ft^2, 27.5 plants/ft^2, and 33 plants/ft^2) on the barley variety CDC Austenson, in Carstairs, Alberta, 2022.

Target plant stand	lbs of seed sown ac^{-1}	Cost of seed ($ ac^{-1})*	Cost per acre above base seeding rate ($ ac^{-1})
Target 22 plants/ft^2	76.7	**$20.71**	-
Target 27.5 plants/ft^2	95.9	**$25.89**	**$5.18**
Target 33 plants/ft^2	115	**$31.05**	**$10.34**

**Assuming $0.27/lb cost for certified barley seed*

Summary

Overall, no significant differences were seen in yield when increasing seeding rates. This contrasts research seen by O'Donovan, 2012 which showed an increase in yield up to 30 plants/ft^2. Plumps and thins were negatively affected with higher seeding rates. However, grain quality impacts would likely not cause economic loss.

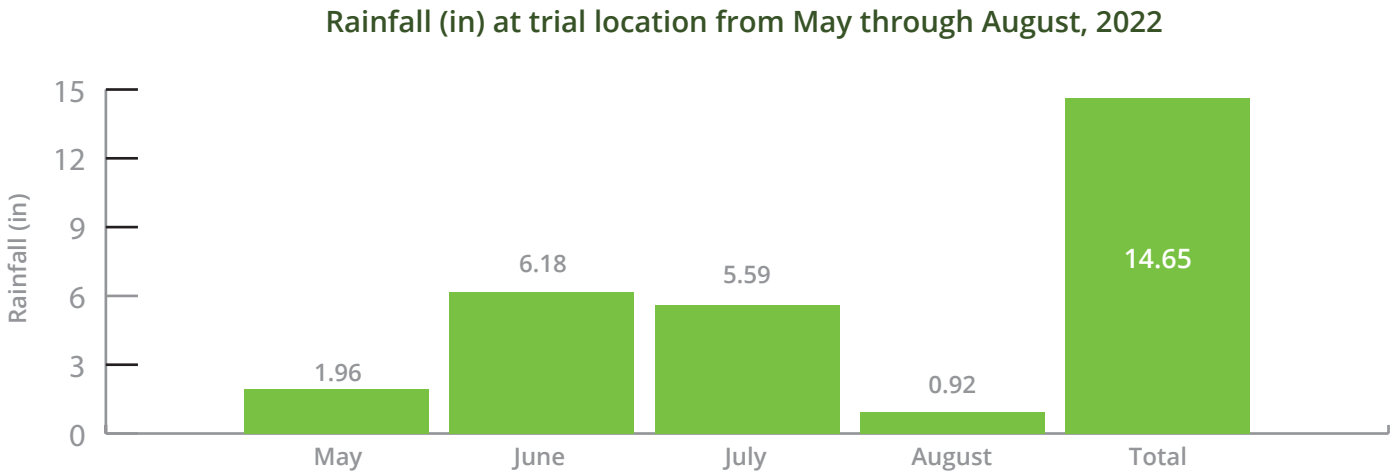
Increasing seeding rates in barley (Ponoka)

This trial was conducted with the agronomic support of Dan Orchard Ag Services Ltd.

Closest Town: Crestomere, Alberta
Soil type: Dark Gray Luvisol on medium textured till
Seeding Date: May 9, 2022
Harvest Date: August 30, 2022
Row Spacing: 31.75 cm (12.5")
Variety(s): Sirish
Reps: Four
Previous Crop: Barley

Tillage: Harrow pack prior to seeding
Herbicides: Pre: None
In-Crop: Outshine®, Brazen™ II
Seed Treatment: Raxil® Pro
Foliar Insecticides: None
Foliar Fungicides: Soratel™
Fertilizer: 80N-31P-36K-5S-0.6Cu total lbs/ac
Irrigation: None

Rainfall:



Introduction

Partnering with Sperber Land & Cattle in Crestomere, Alberta, this trial compared three different seeding rates on the barley variety, Sirish. The trial was seeded using a 20-ft wide Pottinger Terrasem Classic double disk. The crop was seeded in 12.5" row spacings. Seeding rates to target plant stand treatments were determined using thousand kernel weight, germination percentage and farm-specific emergence mortality estimates. The thousand kernel weight of the seed lot was 53g. Seeding rates to attain the treatment target plant stands of 22 (treatment 1), 27.5 (treatment 2) and 33 plants/ft^2 (treatment 3) were 121, 151, and 181lbs of seed ac^{-1}, respectively. Treatments were replicated and randomized.

Treatments

Trial design goal:
To determine the yield and grain quality impacts of seeding rates on barley.

Treatment 1: Target 22 plants/ft^2

Treatment 2: Target 27.5 plants/ft^2

Treatment 3: Target 33 plants/ft^2

Results

In-crop assessment results

Significant differences in plant stand counts collected 21 days after seeding were seen between all treatments. (Table 1).

Yield results

Due to logistical challenges at harvest, replicate treatments were not harvested separately. Therefore, statistical significance cannot be determined. However, results indicate a trend of decreasing yield with increasing seeding rates (Table 1).

Table 1: Plant stand counts, yield, and quality results comparing three target plant stands (22 plants/ft^2, 27.5 plants/ft^2, and 33 plants/ft^2) on the barley variety Sirish, in Crestomere, Alberta, 2022

Target plant stand	Plant stand count at 21 days after seeding (plants/ft^2)	Yield at 13.5% seed moisture content (bu ac^{-1})**	Protein (%)	Thins (%)	Test weight (lb/bu)	Plump (%)
Target 22 plants/ft^2	**24.7 a**	110.3	10.2 a	0.8 a	51.0 a	94.2 a
Target 27.5 plants/ft^2	**29.7 b**	109.3	10.2 a	0.8 a	51.0 a	94.3 a
Target 33 plants/ft^2	**33.6 c**	106.2	10.4 a	0.8 a	50.6 a	94.5 a
***p*-value**	*0.0007*	*N/A*	*0.3638*	*0.6981*	*0.1814*	*0.7412*
CV%	14.27%	N/A	3.95%	14.71%	0.66%	0.48%

*** Due to logistical challenges at harvest, replicate treatments were not harvested separately. Therefore, statistical significance cannot be determined.*
Values with the same letter within a column are not significantly different. Significant difference if p≤0.05.

Grain quality results

No significant differences were observed in grain quality parameters (Table 1).

Economics

Table 2: Economic comparison of different seeding rates (22 plants/ft^2, 27.5 plants/ft^2, and 33 plants/ft^2) on the barley variety, Sirish, in Crestomere, Alberta, 2022.

Target Plant Stand	lbs of seed sown ac^{-1}	Cost of treatment ($ ac^{-1})*	Cost above lowest seeding rate treatment ($ ac^{-1})*
Target 22 plants/ft^2	121	$32.67	-
Target 27.5 plants/ft^2	151	$40.77	**$ 8.10**
Target 33 plants/ft^2	181	$48.87	**$ 16.20**

**Assuming $0.27/lb of certified barley seed*

Summary

Statistical significance could not be determined for yield results between treatments. However, non-statistically significant trends indicate a decreasing yield with increasing seeding rates. No significant differences in quality parameters were seen between treatments.

Nitrogen Fixing Bacterial Trials

Nitrogen fixing foliar bacteria Utrisha-N™ + Envita® in spring wheat (Parkland)

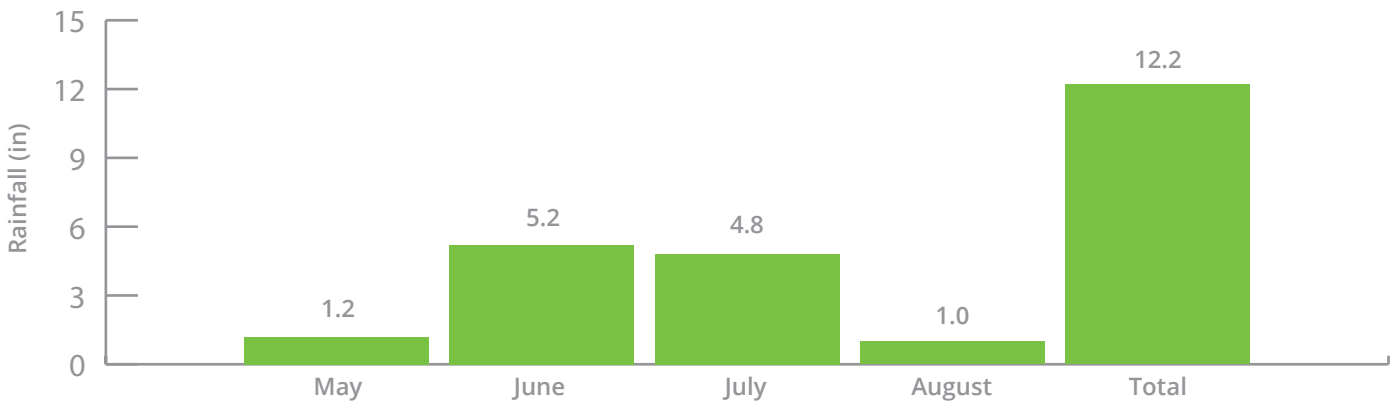
This trial was conducted with the agronomic support of ENtegrity Ag Solutions

Closest Town: Stony Plain
Soil type: Orthic Dark Gray Chernozem
Seeding Date: May 6, 2022
Harvest Date: September 6, 2022
Row Spacing: 30.5 cm (12")
Variety(s): 5700
Reps: Five
Previous Crop: Potatoes
Tillage: Fall cultivation with Salford

Herbicides: Pre: None
In-Crop: Axial Extreme® + Sentrallus™ + MCPA
Seed Treatment: Rancona® Trio
Foliar Insecticides: None
Foliar Fungicides: Folicur® 250 EW
Fertilizer: 100N-35P-35K-5S lbs nutrient/ac
Irrigation: None

Rainfall:

Rainfall (in) at trial location from May through August, 2022



Introduction

Partnering with Vermue Farms in Stony Plain, Alberta this trial compared the impacts of Utrisha-N™ + Envita® on the spring wheat variety 5700. Treatments were compared to an untreated check. The trial was seeded using a Flexicoil hoe drill with 12" (30.5 cm) row spacings and 3" openers. Target plant stand of 32 plants ft^2 using a seeding rate of 165 lbs ac^{-1}. Treatments were replicated and randomized.

As indicated from soil tests, soil nitrogen (NO_{-3}) at 0-6" depth was 28 lbs ac^{-1}. Organic matter for the field was 6.5%.
Utrisha-N™ + Envita® were applied at herbicide timing at label rates for the spring wheat crop. The crop stage at application of Utrisha-N™ and Envita® was five leaf and two tiller. Utrisha-N™ was applied at 135.75 g ac^{-1} and Envita® was applied at 95mL ac^{-1}. Both products were applied as a separate pass to avoid herbicide tank mixing.

Treatments

Trial design goal:

To determine the yield and grain quality impacts of Utrisha-N™ + Envita® on spring wheat.

Treatment 1: Check

Treatment 2: Utrisha-N™ applied at herbicide timing

Treatment 3: Envita® applied at herbicide timing

Results

In-crop assessment results

Plant stand assessments were conducted 21 days after seeding. The average plant stand within the trial area was 31.5 plants/ft^2.

Yield results

No significant differences in yield were seen between treatments (Table 1).

Table 1: Yield, and quality results comparing Utrisha-N™ + Envita® to an untreated check on the Canada Prairie Spring Red (CPRS) variety 5700, in Stony Plain, Alberta, 2022.

Treatment	Yield at 14.5% seed moisture content (bu ac^{-1})	Protein (%)	Test Weight (lb/bu)
Check	123.5 a	11.0 a	65.8 a
Utrisha-N™	123.6 a	10.8 a	65.9 a
Envita®	123.0 a	11.0 a	65.7 a
***p*-value**	*0.5481*	*0.3276*	*0.4871*
CV%	1.13%	2.05%	0.31%

Values with the same letter are not significantly different. Significant difference if p≤0.05.

Grain quality results

No significant differences were seen on any grain quality parameters (Table 1).

Economics

No differences were seen between treatments. Therefore, the most economical treatment is the check.

Summary

No change in yield or quality parameters were seen when Utrisha-N™ and Envita® foliar nitrogen fixing bacteria treatments were applied under these trial conditions.

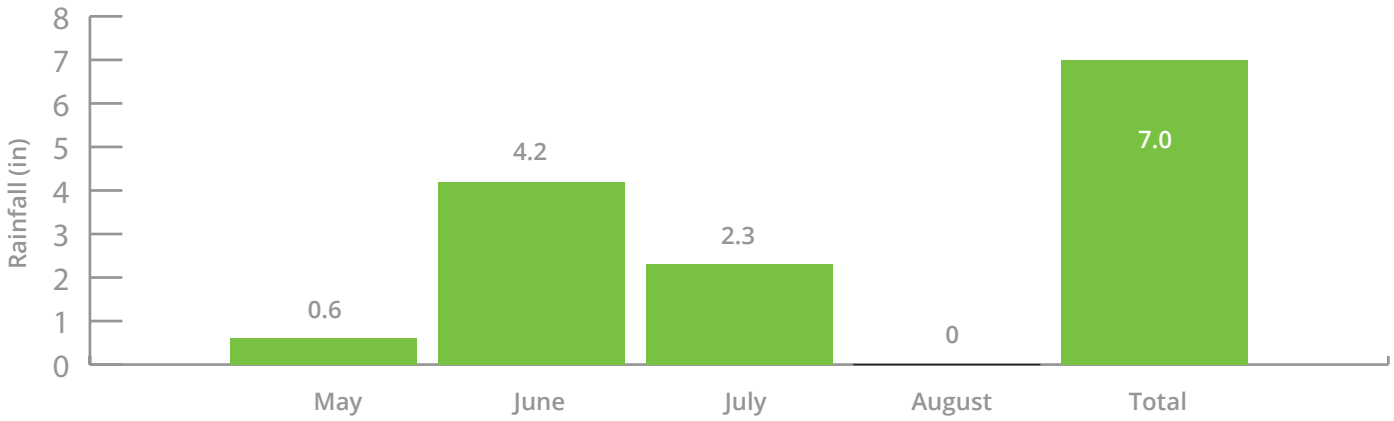
Nitrogen fixing foliar bacteria Utrisha-N™ + Envita® in spring wheat (Willow Creek)

This trial was conducted with the agronomic support of FarmWise Inc.

Closest Town: Claresholm, Alberta
Soil type: Orthic Dark Brown Chernozem on medium textured till
Seeding Date: April 26, 2022
Harvest Date: August 22, 2022
Row Spacing: 10" (25.5 cm)
Variety(s): AAC Brandon
Reps: Four
Previous Crop: Field Pea
Tillage: No
Rainfall:

Herbicides: Pre: Glyphosate + Prepass™ Flex
In-Crop: Simplicity™ GoDRI™ + Octtain™ XL
Seed Treatment: Insure® Cereal
Foliar Insecticides: None
Foliar Fungicides: None
Fertilizer: 70N-22P-0K lbs nutrient/ac
Irrigation: None

Rainfall (in) at trial location from May through August, 2022



Introduction

Partnering with Southwest Farms in Claresholm, Alberta, this trial compared the impacts of Utrisha-N™ + Envita® on the spring wheat variety AAC Brandon. Treatments were compared to an untreated check. The trial was seeded using a New Holland hoe drill with 10" (25.5 cm) row spacings and 31/2" paired row openers. Target plant stand of 27 plants ft^2 using a seeding rate of 90 lbs ac^{-1}. It should be noted that soil moisture at seeding was very poor. Soil moisture was found at the 15" depth (38.1 cm). Treatments were replicated and randomized.

As indicated from soil tests, soil nitrogen (NO_{-3}) at 0-24" depth was 47lbs ac^{-1} (17 lbs ac^{-1} in the 0-6" and 30 lbs ac^{-1} in the 6-24" depth). Field organic matter was 3.0%.

Utrisha-N™ + Envita® were applied at herbicide timing at label rates for the spring wheat crop. Crop stage at application of Utrisha-N™ and Envita® was five leaf and two tiller. Utrisha-N™ was applied at 135.75 g ac^{-1} and Envita® was applied at 95mL ac^{-1}. Both products were applied as a separate pass to avoid herbicide tank mixing.

Treatments

Trial design goal:

To determine the yield and grain quality impacts of Utrisha-N™ + Envita® on spring wheat.

Treatment 1: Check

Treatment 2: Utrisha-N™ applied at herbicide timing

Treatment 3: Envita® applied at herbicide timing

Results

In-crop assessment results

Plant stand assessments were conducted 21 days after seeding. The average plant stand within the trial area was 12 plants ft^2. The below target plant stand was likely related to the very poor soil moisture conditions at and after seeding.

Yield results

No significant differences in yield were seen between any treatments (Table 1).

Table 1: Yield, and quality results comparing Utrisha-N™ + Envita® to an untreated check on the Canada Western Red Spring (CWRS) variety AAC Brandon, in Claresholm, Alberta, 2022.

Treatment	Yield at 14.5% seed moisture content (bu ac^{-1})	Protein (%)	Test Weight (lb/bu)
Check	46.3 a	14.6 a	63.1 a
Utrisha-N™	47.1 a	14.6 a	63.1 a
Envita®	46.8 a	14.7 a	63.2 a
***p*-value**	*0.7954*	*0.2577*	*0.9395*
CV%	4.99%	0.71%	0.41%

Values with the same letter are not significantly different. Significant difference if p≤0.05.

Grain quality results

No significant differences were seen on any grain quality parameters (Table 1).

Economics

No differences were seen between treatments. Therefore, the most economical treatment is the check.

Summary

No change in yield or quality parameters were seen when Utrisha-N™ and Envita® foliar nitrogen fixing bacteria treatments were applied under these trial conditions.

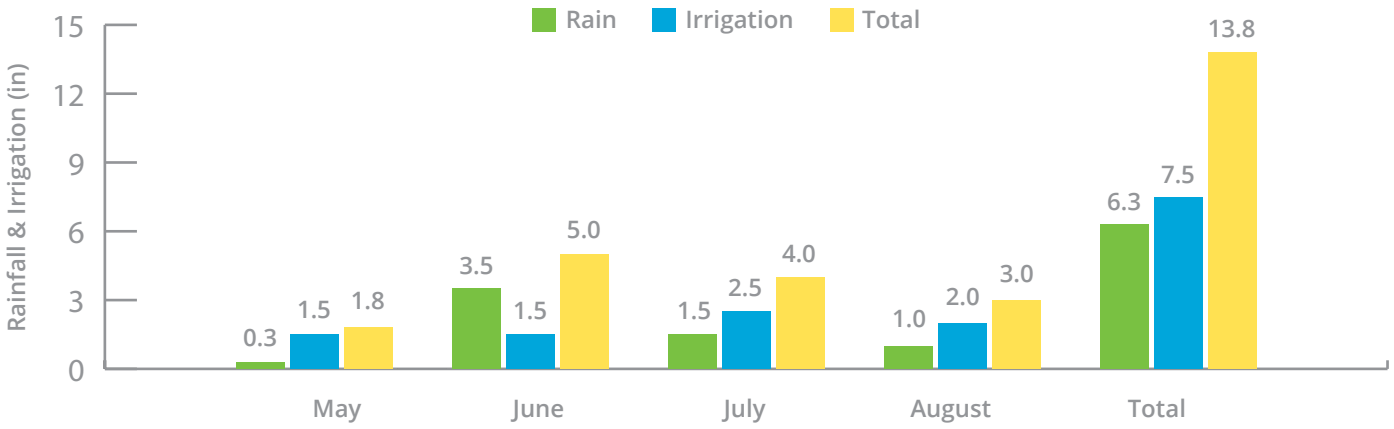
Nitrogen fixing foliar bacteria Utrisha-N™ + Envita® in durum irrigation (Willow Creek)

This trial was conducted with the agronomic support of FarmWise Inc

Closest Town: Barons, Alberta
Soil type: Orthic Dark Brown Chernozem on medium textured sediments
Seeding Date: April 30, 2022
Harvest Date: September 14, 2022
Row Spacing: 10" (25.5 cm)
Variety(s): AAC Stronghold
Reps: Four
Previous Crop: Yellow Pea
Tillage: None
Rainfall & Irrigation:

Herbicides: Pre: Roundup Transorb® + Blackhawk®
In-Crop: Varro® + Buctril M®
Seed Treatment: Teraxxa® F4
Foliar Insecticides: None
Foliar Fungicides: Folicur® 250 EW
Fertilizer: At and prior to seeding: 172N-30P-0K-10S lbs nutrient/ac PLUS 20lbs N applied through fertigation on July 9

Rainfall (in) at trial location from May through August, 2022



Introduction

Partnering with Bishop Farms Ltd. in Barons, Alberta, this trial compared the impacts of Utrisha-N™ + Envita® on the durum wheat variety AAC Stronghold. Treatments were compared to an untreated check. The trial was seeded using a Bourgault Paralink hoe drill with 10" (25.5 cm) row spacings and ¾" openers. Target plant stand of 21 plants ft^2 using a seeding rate of 110 lbs ac^{-1}. Treatments were randomized and replicated.

As indicated from soil tests, soil nitrogen (NO_{-3}) at 0-12" depth was 35 lbs ac^{-1}. Field organic matter was 2.9%.
Utrisha-N™ + Envita® were applied at herbicide timing at label rates for the spring wheat crop. Crop stage at application of Utrisha-N™ and Envita® was five to six leaf with two to three tillers. Utrisha-N™ was applied at 135.75 g ac^{-1} and Envita® was applied at 95mL ac^{-1}. Both products were applied as a separate pass to avoid herbicide tank mixing.

Treatments

Trial design goal:

To determine the yield and grain quality impacts of Utrisha-N™ + Envita® on durum wheat.

Treatment 1: Check

Treatment 2: Utrisha-N™ applied at herbicide timing

Treatment 3: Envita® applied at herbicide timing

Results

In-crop assessment results

Plant stand assessments were conducted 21 days after seeding. The average plant stand within the trial area was 22 plants/ft^2.

Yield results

No significant differences in yield were seen between any treatments (Table 1).

Table 1: Yield, and quality results comparing Utrisha-N™ + Envita® to an untreated check on the Canada Western Amber Durum (CWAD) variety AAC Stronghold in Barons, Alberta, 2022.

Treatment	Yield at 14.5% seed moisture content (bu ac^{-1})	Protein (%)	Test Weight (lb/bu)
Check	105.6 a	14.8 a	63.5 a
Utrisha-N™	104.2 a	14.6 a	63.2 a
Envita®	103.3 a	15.0 a	64.0 a
***p*-value**	*0.6023*	*0.2608*	*0.266*
CV%	3.88%	2.07%	1.09%

Values with the same letter are not significantly different. Significant difference if p≤0.05.

Grain quality results

No significant differences were seen on any grain quality parameters (Table 1).

Economics

No differences were seen between treatments. Therefore, the most economical treatment is the check.

Summary

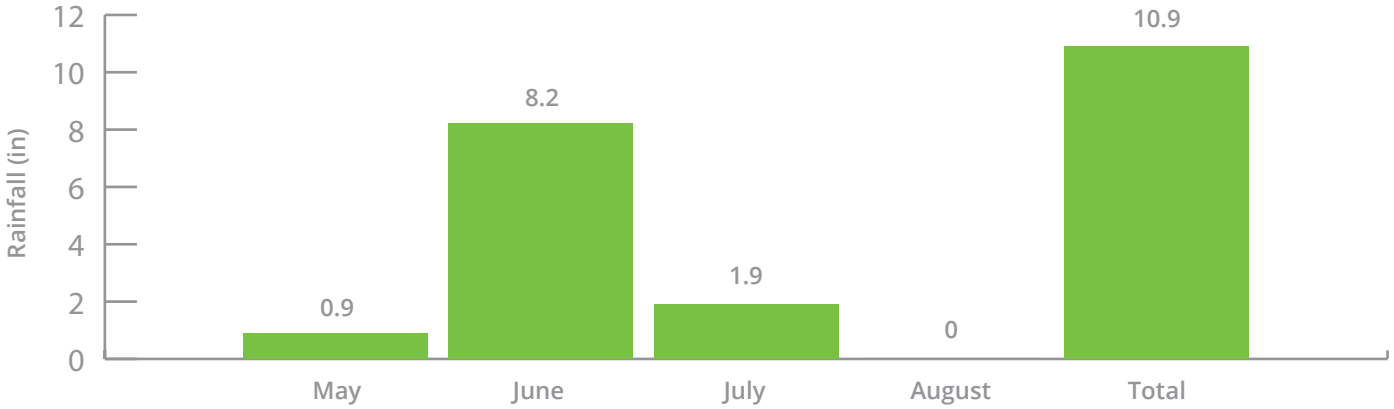
No change in yield or quality parameters were seen when Utrisha-N™ and Envita® foliar nitrogen fixing bacteria treatments were applied under these trial conditions.

Nitrogen Fixing Foliar Utrisha-N™ in spring wheat (Mountain View)

Closest Town: Carstairs, Alberta
Soil type: Medium textured Orthic Black Chernozem
Seeding Date: May 3, 2022
Harvest Date: September 5, 2022
Row Spacing: 25.4 cm (10"), 3" paired row
Variety(s): CDC Abound
Reps: Four
Previous Crop: Canola
Tillage: Fall disk

Herbicides: Pre: PrePass™ Flex + Roundup Weathermax®
In-Crop: Altitude FX® 3 + MCPA Ester
Seed Treatment: Vibrance® Quattro
Foliar Insecticides: None
Foliar Fungicides: Trivapro®
Fertilizer:
99N-38.5P-11K lbs nutrient/ac
Irrigation: None

Rainfall (in) at trial location from May through August, 2022



Introduction

Partnering with Triple H Farms in Carstairs, Alberta this trial compared the impacts of Utrisha-N™ on the spring wheat variety CDC Abound compared to an untreated check. The trial was seeded using a 60-ft wide drill with 10" (25.5 cm) row spacings and 3" (7.5 cm) openers. Target plant stand of 32 plants ft^2 using a seeding rate of 165 lbs ac^{-1}. Treatments were replicated and randomized.

As indicated from soil tests, soil nitrogen (NO_3) at 0-18" depth was 20 lbs ac^{-1}. Organic matter for the field was 7.7%. Utrisha-N™ was applied at herbicide timing at label rates for the spring wheat crop. Crop stage at application of Utrisha-N™ was five to six leaf and two to three tiller. Utrisha-N™ was applied at 135.75 g ac^{-1}. Utrisha-N™ was applied as a separate pass to avoid herbicide tank mixing.

Treatments

Trial design goal:
To determine the yield and grain quality impacts of Utrisha-N™ on spring wheat.

Treatment 1: Check

Treatment 2: Utrisha-N™ applied at herbicide timing

Results

In-crop assessment results

Plant stand assessments were conducted 21 days after seeding. The average plant stand within the trial area was 24.4 plants ft^2.

Yield results

No significant differences in yield were seen between any treatments (Table 1).

Table 1: Yield, and quality results comparing Utrisha-N™ to an untreated check on the Canada Prairie Spring Red (CPRS) variety CDC Abound in Carstairs, Alberta, 2022.

Treatment	Yield at 14.5% seed moisture content (bu ac^{-1})	Protein (%)	Test Weight (lb/bu)
Check	86.6 a	11.6 a	67.1 a
Utrisha-N™	89.6 a	11.5 a	67.1 a
***p*-value**	*0.3709*	*0.6042*	*0.1817*
CV%	4.54%	1.46%	0.09%

Values with the same letter are not significantly different. Significant difference if p≤0.05.

Grain quality results

No significant differences were seen on any grain quality parameters (Table 1).

Economics

No differences were seen between treatments. Therefore, the most economical treatment is the check.

Summary

No change in yield or quality parameters were seen when Utrisha-N™ foliar nitrogen fixing bacteria treatments were applied under these trial conditions.

Plant Growth Regulator Trial

Manipulator™ 620 application on spring wheat (Two Hills No.21)

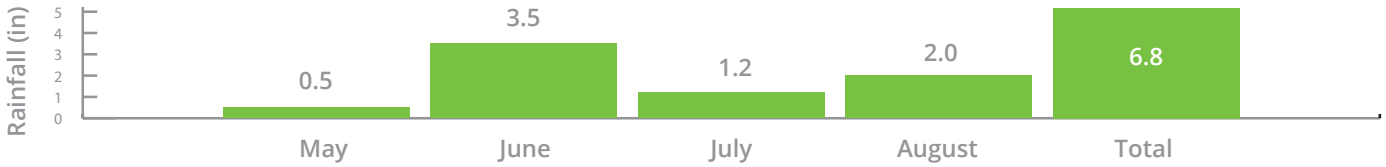
This trial was conducted with the agronomic support of Christine Suominen at Richardson Lamont

Closest Town: Willingdon, Alberta
Soil type: Orthic Black Chernozem on coarse textured materials over medium or fine textured till
Seeding Date: May 15, 2022
Harvest Date: September 10, 2022
Row Spacing: 10" (25.5 cm)
Variety(s): AAC Wheatland VB
Reps: Five
Previous Crop: Canola
Tillage: Harrowed in the fall

Herbicides: Pre: Priority® + Glyphosate
In-Crop: Everest® + Pixxaro™
Seed Treatment: None
Foliar Insecticides: None
Foliar Fungicides: Sphaerex™
Fertilizer:
90N-30P-10K-0S
Irrigation: None

Rainfall:

Rainfall (in) at trial location from May through August, 2022



Introduction

Partnering with Porozni Farms in Willingdon, Alberta, this trial compared plant growth regulator Manipulator application on the CWRS variety AAC Wheatland VB. The trial was seeded using a Bourgault seeding with 10" (25.5 cm) row spacings and 2" openers. Manipulator plant growth regulator applied GS 31 using a 120 ft sprayer at 10gal/ac water volume. Treatments were replicated and randomized.

Treatments

Trial design goal:
To determine the yield and grain quality impacts of plant growth regulator Manipulator application on yield and quality of spring wheat production.

Treatment 1: Check

Treatment 2: Manipulator™ 620 applied at GS31-32 @ 0.7L/ac

Results

In-crop assessment results
Imagery collected by drone indicated visual lodging differences between treatments. Treatment areas were determined (Figure 1) with 2.5 m buffers on either side of the treatment areas to avoid inclusion of sprayer tracks in the visual lodging assessment. Through computer analysis conducted by Olds College, treatment areas were assessed for total and percent lodging within treatment areas. Lodging was categorized as 'major' or 'minor' (Figure 2). Major lodging included lodging where the crop was clearly laying horizontal. Minor lodging includes any visual lodging other than major lodging. Application of Manipulator™ 620 significantly impacted all lodging factors assessed (Figure 3 & 4) by decreasing the amount of major and minor lodging areas.

Figure 1: Drone imagery of trial area with treatment areas outlined.

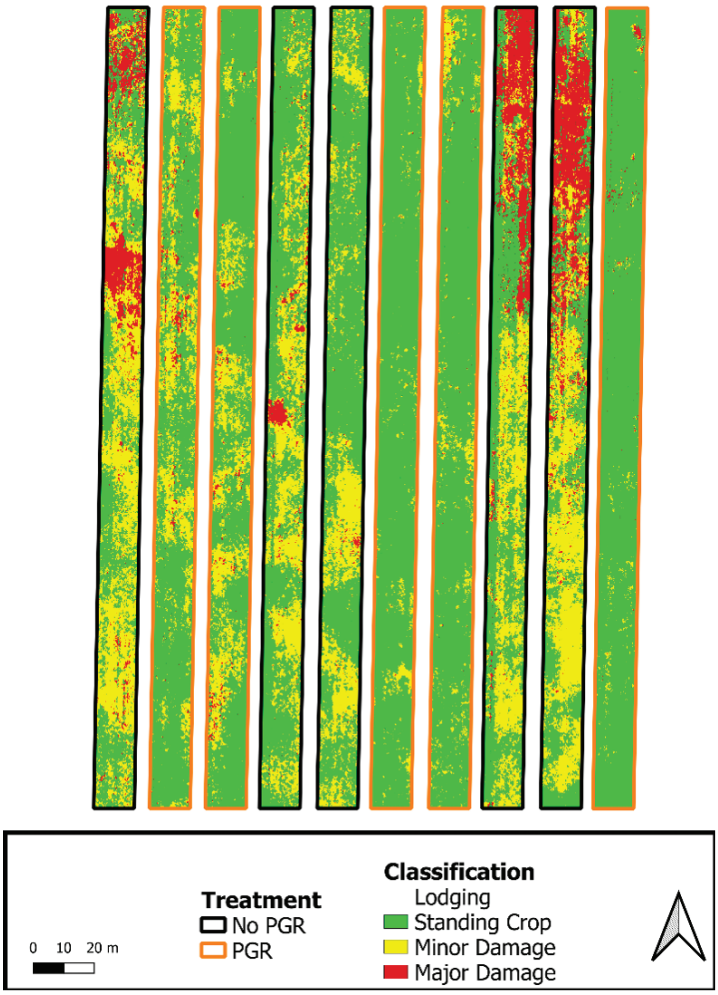


Figure 2: Drone imagery of trial area with treatment areas outlined and visual differentiation between standing, minor lodged and major lodged crop.

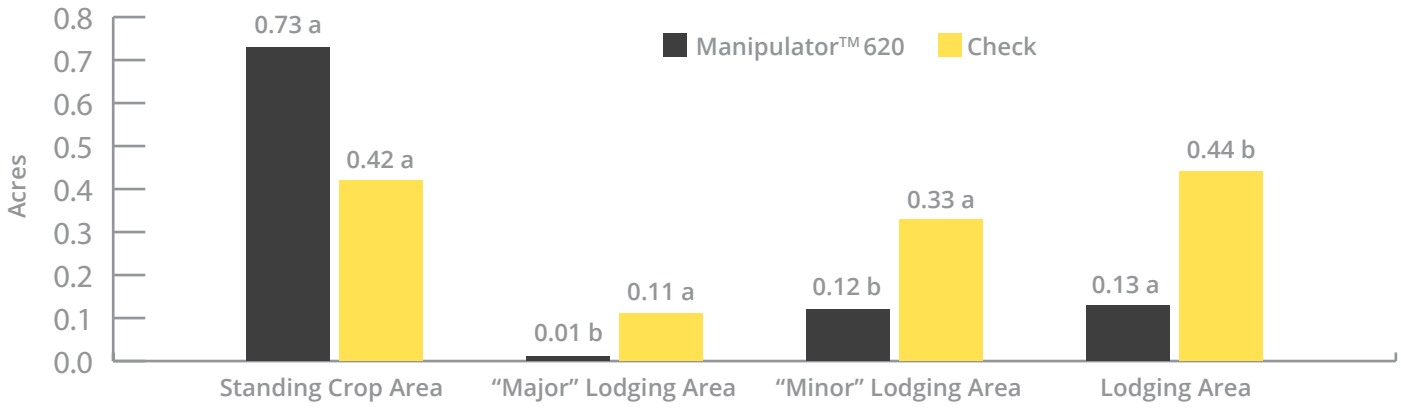


Figure 3: Impact of application of Manipulator™ 620 on various lodging characteristics, in acres, on AAC Wheatland in Willingdon, Alberta

Values with alphabetical value that differ within each lodging characteristic indicate significant difference p<0.05

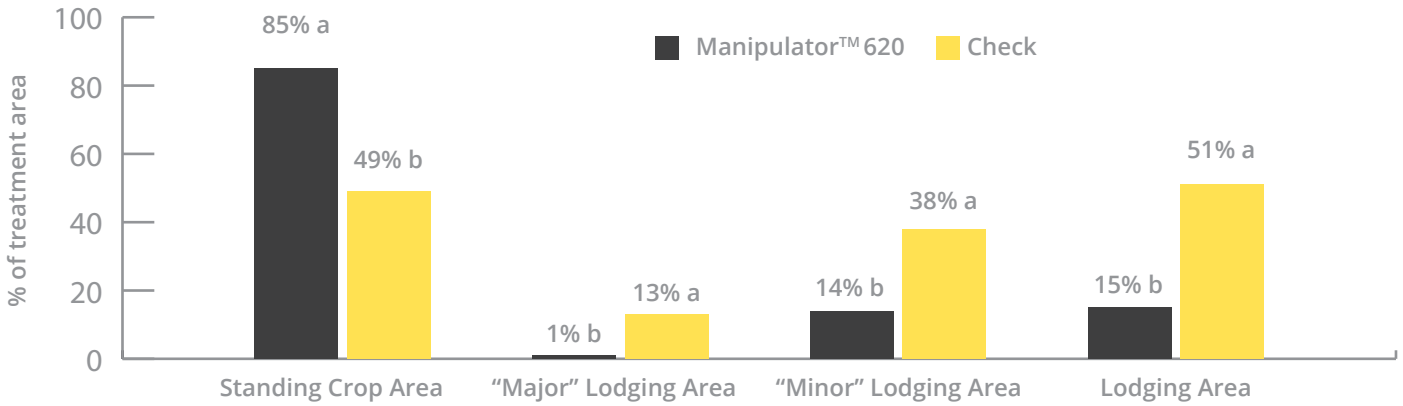


Figure 4: Impact of application of Manipulator™ 620 on various lodging characteristics, in percentage of treatment area, on AAC Wheatland in Willingdon, Alberta

Bars with alphabetical value that differ within each lodging characteristic indicate significant difference p<0.05

Yield results

Yield results were not significant based on P<0.05. However, statistical analysis indicates the results are close to significant (P=0.0597).

Table 1: Yield, and quality results comparing Manipulator™ 620 to an untreated check on the Canada Western Red Spring (CWRS) variety AAC Wheatland VB in Willington, Alberta, 2022.

Treatment	Yield at 14.5% seed moisture content (bu ac^{-1})	Protein (%)	Test Weight (lb/bu)
Check	90.0 a	15.3 a	67.1 a
Manipulator™ 620	94.8 a	15.1 a	67.1 a
***p*-value**	*0.0597*	*0.0608*	*0.208*
CV%	4.22%	2.42%	0.18%

Values with the same letter are not significantly different. Significant difference if p≤0.05.

Grain quality results

No significant differences in grain quality were seen between treatments.

Economics

No significant differences were seen between treatments. Therefore, when only considering yield, the most economical treatment is the check. However, the difference of yield between treatments was close to significant. Additionally, the economic implications of combine fuel required to harvest lodged crops was not calculated. Considering the check treatment has significantly higher lodging (Figure 3 & 4), it could be assumed that these treatments would require more fuel and time to harvest.

Summary

Application of Manipulator™ 620 on AAC Wheatland VB resulted in no significant difference in yield (just barely). However, application of Manipulator™ 620 resulted in significant changes in minor and major lodging percentage. Equipment operation also indicated increased challenges during harvest of the check treatments compared to the Manipulator™ 620 treatment. This indicates there could be an economic savings of time and fuel on the Manipulator™ 620 treatment.

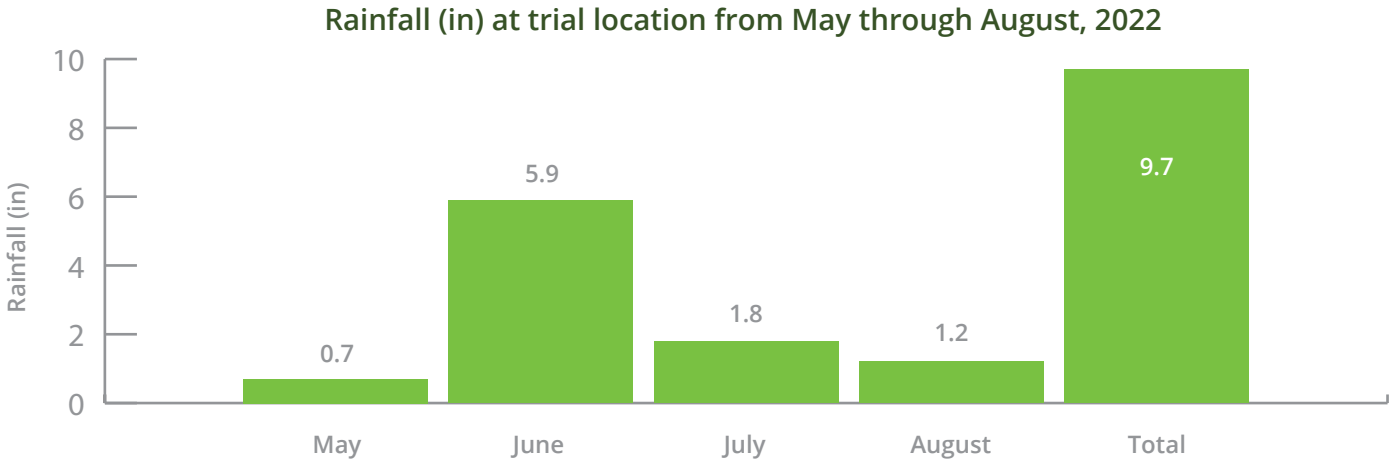
Row Spacing Trial

7.5″ vs 15″ row spacing in spring wheat (Foothills)

Closest Town: Blackie, Alberta
Soil type: Orthic Black Chernozem on medium textured till
Seeding Date: May 6, 2022
Harvest Date: September 6, 2022
Row Spacing: 7.5″ (19 cm) and 15″ (38 cm)
Variety(s): CDC Go
Reps: Five
Previous Crop: Peas
Tillage: None

Herbicides: Pre: PrePass™ Flex + Glyphosate
In-Crop: Simplicity™ GoDRI™ + Octtain™ XL
Seed Treatment: Raxil®
Foliar Insecticides: None
Foliar Fungicides: Orius® 430 SC
Fertilizer: 70N-27P-0K-0S
Irrigation: None

Rainfall:



Introduction

Partnering with Newman Farms in Blackie, Alberta, this trial compared 7.5″ rows to 15″ rows on the spring wheat variety CDC Go. The trial was seeded using a 60-foot SeedMaster UltraSR drill with 38 cm (15″) and 19 cm (7.5″) row spacings. The 19 cm (7.5″) row spacings were implemented by making two passes and seeding between the first pass rows using RTK. To adjust for two passes, seed and Fertilizer rates were applied at half rates for each pass. To account for the compaction caused by the extra pass required on the 19 cm (7.5″) treatment, a non-working pass was made on each 38 cm (15″) row treatment to increase compaction uniformity between treatments. Treatments were replicated and randomized.

Treatments

Trial design goal:
To determine the yield and grain quality impacts of 7.5″ to 15″ rows on spring wheat production.

Treatment 1: 7.5″ rows

Treatment 2: 15″ rows

Results

In-crop assessment results
Plant stand assessments were conducted 21 days after seeding to potential differences in plant stand due to row spacing. Row spacing had no effect on the plant stand. The 7.5″ rows and 15″ rows had non-significantly different plant stands of 33.1 and 30.6 plants/ft^2 (Table 1).

Above: Trial photo taken July 13, 2022, comparing 15" rows (left) and 7.5" rows (right).

Yield results

Row spacing had significant effects on the yield of CDC Go. 15" rows led to a 3% reduction in yield from 84.1 bu ac^{-1} to 81.8 bu ac^{-1}.

Table 1: Yield, and quality results comparing 7.5" to 15" rows on the Canada Western Red Spring (CWRS) variety CDC Go in Blackie, Alberta, 2022.

Treatment	Plant stand count at 21 days after seeding (plants/ft^2)	Yield at 14.5% seed moisture content (bu ac^{-1})	Protein (%)	Test Weight (lb/bu)
7.5" Row Width	33.1 a	**84.1 a**	**11.4 a**	66.8 a
15" Row Width	30.6 a	**81.8 b**	**12.1 b**	66.7 a
***p*-value**	*0.4479*	*0.0445*	*0.0006*	*0.3*
CV%	16.07%	2.91%	3.46%	0.21%

Values with the same letter are not significantly different. Significant difference if p≤0.05.

Grain quality results

Under 15" rows, protein increased 6% from 11.4% to 12.1% when compared to 7.5% rows.

Economics

Table 2: Economic comparison of 7.5" and 15" row spacing on the Canada Western Red Spring (CWRS) variety CDC Go in Blackie, Alberta, 2022.

Treatment	Yield at 14.5% seed moisture content (bu ac^{-1})	Profit ($ ac^{-1})*
7.5" Row Width	**84.1**	$925.10
15" Row Width	**81.8**	**$899.80**

Assuming $11.00/bu at the elevator

When focusing on yield, the economics of the 7.5" row spacing was superior. However, wide row spacing comes with economic benefits such as equipment and fuel costs. That being said, wider row spacing may pose longer term economic challenges such as weed competition. A true assessment of economic viability between treatments would require long term analysis.

Summary

15" rows in spring wheat led to a decrease in yield by 3%. However, the wider row spacing led to an increase in protein by 6%.

Fertilizer Trials

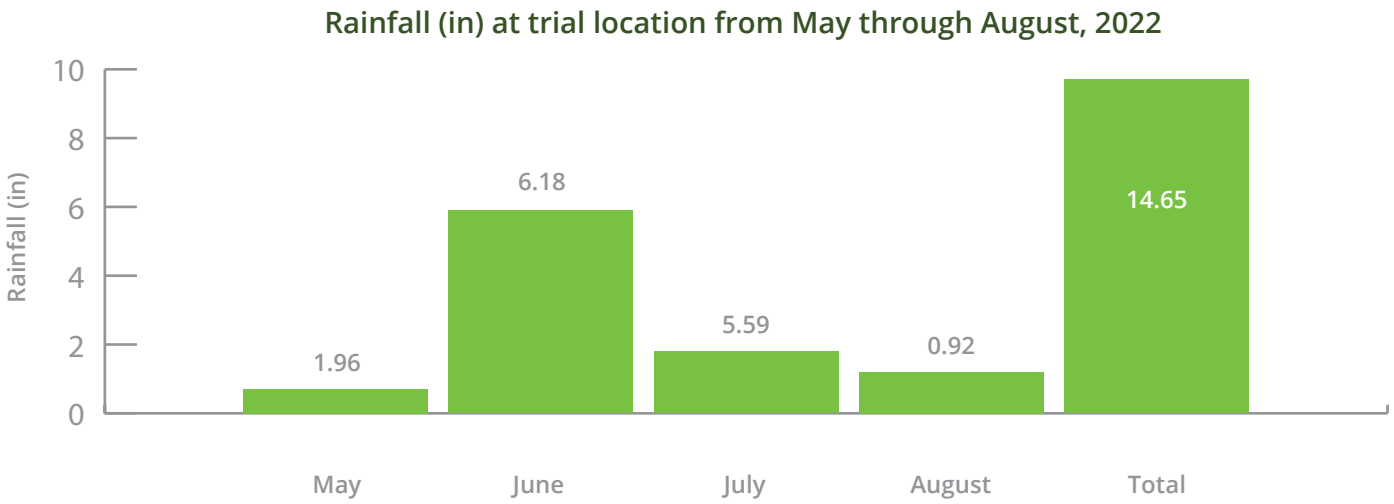
Increasing nitrogen rates in barley (Lacombe)

This trial was conducted with the agronomic support of Dan Orchard Ag Services Ltd.

Closest Town: Bentley, Alberta
Soil type: Orthic Dark Gray Chernozem on medium textured sediments
Seeding Date: May 11, 2022
Harvest Date: September 1, 2022
Row Spacing: 25.5 cm (10")
Variety(s): Sirish
Reps: Four
Previous Crop: Canola

Tillage: Fall deep tillage, spring harrow
Herbicides: Pre: Avadex®
In-Crop: Puma® & Pixxaro™
Seed Treatment: Vibrance® Quattro & Awaken® ST
Foliar Insecticides: None
Foliar Fungicides: Quilt®
Fertilizer: (Nitrogen varied between treatments)-40P-26K-0S lbs nutrient/ac
Irrigation: None

Rainfall:



Introduction

Partnering with Lenz Farms in Bentley, Alberta, this trial compared increasing nitrogen rates on the barley variety, Sirish. The trial was seeded using a hoe style Case IH seeder with 10" row spacings and Dutch low-draft 4" paired row openers. A base level nitrogen fertility rate of 65 lbs was determined using soil testing and yield goals in relation to farm and field history. Additional treatments of increasing nitrogen were determined by adding an additional 20 lbs of nitrogen ac^{-1} and 40 lbs of nitrogen ac^{-1}. Other macro nutrients were assessed and applied to mitigate potential deficiencies in all treatments. Treatments were replicated and randomized.

Treatments

Trial design goal:
To determine the yield and grain quality impacts of increasing nitrogen rates on barley.

Treatment 1: 65 lbs of nitrogen ac^{-1}
Treatment 2: 85 lbs of nitrogen ac^{-1}
Treatment 3: 105 lbs of nitrogen ac^{-1}

Results

In-crop assessment results

Plant stand counts were collected 21 days after seeding. Significant differences in plant stands were seen between treatments (Table 1). The highest nitrogen rate treatment saw a decrease in plant stand from 35.3 plants ft^{-2} to 31.3 plants ft^{-2} as compared to the lowest nitrogen rate treatment. It is possible that seed bed utilization as well as fertilizer toxicity impacted germination and establishment. The middle nitrogen rate (85 lbs N ac^{-1}) was not significantly different than the high or low nitrogen rate treatments.

Yield results

Treatments had a significant effect on yield. However, not in the anticipated direction. The yield of the highest nitrogen rate treatment (139.9 bu ac^{-1}) was significantly lower than the lowest nitrogen rate treatment (149.9 bu ac^{-1}). The middle nitrogen rate treatment (143.3 bu ac^{-1}) was not significantly different than the highest and lowest nitrogen rate treatments. The differences between treatments may have been caused by the increased lodging rates seen within the higher nitrogen rate treatments (Figure 1). However, this cannot be confirmed.

Table 1: Yield, and quality results comparing increasing nitrogen rates of 65lbs nitrogen ac^{-1}, 85 lbs nitrogen ac^{-1}, and 105 lbs nitrogen ac^{-1} on the barley variety Sirish in Bentley, Alberta, 2022.

Applied Nitrogen Rate (lbs/ac of N)	Plant stand count at 21 days after seeding (plants/ft^2)	Yield at 13.5% seed moisture content (bu ac^{-1})	Protein (%)	Thins (%)	Greens	Test Weight (bu/ac)	Plump (%)
65 lbs N/ac	**35.3 a**	**149.9 a**	**10.8 a**	**1.0 a**	**0.03 a**	62.4 a	**94.0 a**
85 lbs N/ac	**33.8 ab**	**143.3 ab**	**11.6 b**	**1.6 b**	**0.13 ab**	62.8 a	**90.7 b**
105 lbs N/ac	**31.3 b**	**139.9 b**	**12.0 b**	**1.6 b**	**0.23 b**	62.8 a	**91.0 b**
***p*-value**	*0.0312*	*0.021*	*0.0016*	*0.0098*	*0.0029*	*0.0844*	*0.003*
CV%	7.04%	4.19%	5.34%	27.54%	77.22%	0.60%	1.92%

Values with the same letter are not significantly different. Significant difference if p≤0.05.

Figure 1: Images of increasing nitrogen rate trial (65 lbs nitrogen ac^{-1}, 85 lbs nitrogen ac^{-1}, and 105 lbs nitrogen ac^{-1}) on Sirish barley comparing lodging visuals. Image taken August 6, 2022.

Grain quality results

Treatments had a significant effect on grain quality. Grain protein, thins, and plump were significantly lower in the lowest nitrogen rate treatment as compared to the two higher nitrogen rate treatments. Greens were lowest in the low nitrogen rate treatment.

Economics

Table 2: Economic comparison of increasing nitrogen rates (65 lbs N ac^{-1}, 85 lbs N ac^{-1} and 105 lbs N ac^{-1}) row spacing on the barley variety Sirish in Bentley, Alberta, 2022.

Applied Nitrogen Rate (lbs ac^{-1} of N)	Nitrogen cost ac^{-1} ($)*	Yield ac^{-1}	Profit**	Profit difference compared to lowest nitrogen rate ($ ac^{-1})
65 lbs N/ac	$ 83.20	149.9	$ 1,190.95	-
85 lbs N/ac	$ 108.80	143.3	$ 1,109.25	**-$ 81.70**
105 lbs N/ac	$ 134.40	139.9	$ 1,054.75	**-$ 136.20**

** Assuming $1300/tonne urea ($1.28/lb N)*

***Assuming $8.50/bu elevator price*

Summary

Increased nitrogen rates provided lower yield and lower profitability per acre. The lower yields may have been impacted by higher occurrence of lodging in the higher nitrogen rate treatments. Nitrogen rates significantly impacted protein, thins, greens, and plump kernels. This trial demonstrates the value of understanding relationships and synergistic effects of multiple agronomic management practices. Increasing nitrogen may have less of a negative effect or may provide a positive effect on yield if additional agronomic inputs such at plant growth regulators are implemented as well. This would depend on the response of Sirish to plant growth regulators in conditions similar to this trial.

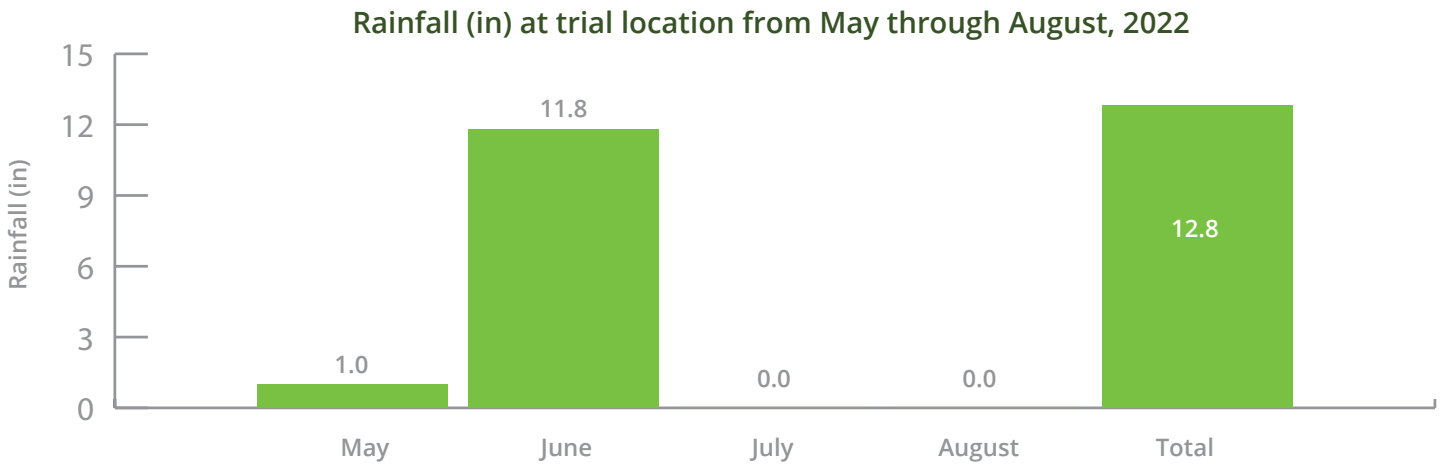
Split nitrogen application in spring wheat (Kneehill)

This trial was conducted with the agronomic support of Centrefield Solutions

Closest Town: Three Hills, Alberta
Soil type: Orthic Dark Brown Chernozem on medium textured till
Seeding Date: April 30, 2022
Harvest Date: September 3 2022
Row Spacing(cm): 10" (25.5 cm)
Variety(s): CDC Go
Reps: Four
Previous Crop: Yellow Peas
Tillage: None

Herbicides: Pre: None
In-Crop: Axial + Buctril M
Seed Treatment: Raxil Pro
Foliar Insecticides: None
Foliar Fungicides: Prosaro XTR
Fertilizer: 140N-40P-0-0 actual nutrient/ac (this field also receives 300lbs/ac of Biosul every 3 years)
Irrigation: None

Rainfall:



Introduction

Partnering with Sage Creek Farms in Three Hills, Alberta, this trial compared split nitrogen application to all nitrogen banded at seeding on the CWRS variety CDC Go. The trial was seeded using a Bourgault seeding with 10" (25.5 cm) row spacings and 2" openers. Nitrogen applied at seeding was applied as urea in a side-band. In-crop nitrogen was applied as UAN (28%) using a 120ft sprayer and streamer bars. Half water half UAN and doubled volume. Treatments were replicated and randomized.
As indicated from soil tests, soil nitrogen (NO_{-3}) at 0-12" depth was 23 lbs ac^{-1}. Field organic matter and pH in the top 6" was 5.1% and 5.8%, respectively.

Treatments

Trial design goal:
To determine the yield and grain quality impacts of split nitrogen application on spring wheat production.

Treatment 1: All nitrogen at time of seeding (140 lbs of N/ac)

Treatment 2:
57% (80 lbs N/ac) of nitrogen at time of seeding followed by
21% (30 lbs of N/ac) at beginning of stem elongation followed by
21% (30 lbs of N/ac) at end of booting stage

Results

In-crop assessment results

Plant stand assessments were conducted 21 days after seeding to potential differences in plant stand due to treatments. Treatments had no effect on the plant stand.

Yield results

No significant differences in yield were seen between any treatments (Table 1).

Table 1: Yield, and quality results comparing split nitrogen application on the Canada Western Red Spring (CWRS) spring wheat variety CDC Go in Three Hills, Alberta, 2022.

Treatment	Plant stand count at 21 days after seeding (plants/ft^2)	Yield at 14.5% seed moisture content (bu/ac)	Protein (%)	Test Weight (lbs/bu)
Nitrogen at seeding	47.1 a	90.5 a	**13.8 b**	65.88 a
Split application	46.1 a	90.4 a	**14.3 a**	65.72 a
***p*-value**	*0.4453*	*0.9717*	*0.0006*	*0.4228*
CV%	5.66%	4.07%	3.46%	0.21%

Values with the same letter are not significantly different. Significant difference if p≤0.05.

Grain quality results

The split nitrogen application treatment led to a significant increase in grain protein of 0.5%.

Economics

Considering no yield difference between treatments and a 0.5% protein increase, increased economics through split nitrogen application would depend on potential value of additional protein. As of November 2022, the additional 0.5% protein under split nitrogen application would provide an additional $0.01 per bushel. Assuming equal cost of nitrogen source, and a modest application cost of $7.00 per acre, the split nitrogen treatment is the least economic approach to nitrogen fertilizer application.

Summary

Split nitrogen application did not provide yield benefit. However, a 0.5% increase in grain protein was seen. Economically, the treatment of applying all nitrogen at the time of seeding was best. However, results indicate that a split nitrogen application did not cause a decrease in yield. Therefore, split nitrogen application can be a tactic utilized in scenarios where confidence in yield targets is limited due to spring available moisture. Producers may apply less nitrogen at seeding to mitigate risk and decide to apply more nitrogen in-season if environmental conditions are conducive for yield gain.