Battle River Research Group

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# ANNUAL REPORT 2021

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## To test agriculture practices, products and technologies

Battle River Research Group

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***Improve Agriculture with Independent Producer Driven Research***

Contact: **Khalil Ahmed, PhD, P.Ag**
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| Research Team | | |
|---|---|---|
| **Khalil Ahmed** | General Manager | **PhD., PAg.** |
| **Nasima Junejo** | Research Program Manager | **PhD., PAg** |
| **Alexander Olson** | Field Coordinator | **B.Sc.** |
| **Karin Lindquist** | Extension/Envi. Agrologist | **B.Sc., PAg.** |
| **BRRG employ 5 summer students every year** | | |


**Battle River Research Group** is a producer-led research organization located in East Central Alberta. BRRG owns a Facility in Forestburg that includes a fenced compound, and an over 3000 sq. ft shop and an office building.

We offer small plot research services under supervision of qualified staff. We are research partner in many government and industrial research projects including variety, fertilizers and soil health research. Please check our website battleriverresearch.com for further details about projects

Battle River Research Group

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## MISSION

Advancing agriculture as an independent, producer-driven resource

## VISION

Beyond sustainability through innovation in agriculture

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4804 - 43 Ave, Forestburg, AB | 780-582-7380

# President Report 2021

BY COLIN WAGER

Battle River Research Group is committed to improving agriculture through producer-driven research and providing extension events to farmers in our area. Our goal is to bring farmers new ideas and techniques that they can use in their operation and bring the latest info from BRRG and other research groups into our extension events.

If you remember last year's report, Covid hit just as I was elected president of BRRG. But at BRRG we have pushed on with business just the same as all farmers in the area.

There was plenty of masks and hand sanitizer used but we did what needed to be done. Some zoom meetings were held, but more in-person meetings happened as I feel we have a much more productive meeting as a result. Still, emails, texting and phone calls happened when required.

This year I can say that Khalil Ahmed our Manager and his team have really stepped up and are well on the way to making BRRG great again. The board and I are very grateful to have a person with his knowledge and experience. Part of that team is Nasima Junejo. She continues to write reports and proposals to bring many jobs to our Association as well as to keep Khalil in line if he ever strays. We need to grow our business to ensure that BRRG will be around for many years for our members.

**COLIN WAGER**
**BOARD OF DIRECTORS PRESIDENT**

**Well Done Khalil!!**

I would like to say thank you to Khalil, his team, our fabulous board of directors, BRRG members, our 4 counties, Paintearth, Flagstaff, Stettler, and Beaver for their support, our corporate supporters. All are very important and we couldn't do it as well without your knowledge and assistance.

# Manager Report 2021

KHALIL AHMED PHD., PAG

**KHALIL AHMED PHD., PAG**
MANAGER & COMMUNICATION COORDINATOR

I would say overall 2021 was another successful year for the Battle River Research Group. The COVID19 protocols were adopted at work, and we were able to seed 50 research trials at six different locations (over 2,500 research plots) including hemp, soil amendments, and on-farm corn silage research trials.

Two full-time staff members are new additions to the BRRG gang, and five summer students were also hired.
Three out of five summer students were hired from our local farming community. They are studying in agricultural programs in Lakeland and Olds colleges.

This year many online events, crop walks, and in-person consultations were conducted at the auction markets in Viking and Stettler, respectively. When Alberta Government eased the COVID-19 restrictions in August, we switched gears very quickly and conducted an in-person field day. The event was well-attended and turned out to be very successful.

Thanks to RDAR, Alberta Wheat, SeCan, Lakeland College, 20/20 Seed Lab Inc, Corn Ranches Inc, Dr. Michael Harding, and Keith Gabert for speaking at the field day. Sorry, if I missed anyone.

Special thanks to our MP Damien C. Kurek for attending field day and supporting BRRG.

Our services were continued which include pest monitoring, feed analysis, soil health sampling and consulting on forages, pasture, hay stands, and crops.

The BRRG website is still receiving a good, constant amount of traffic since the podcasts, webinars, blogs, videos, and presentations were regularly being uploaded providing producers content to watch or read at any time.
I am happy that BRRG is accelerating very quickly! We are committed to serve our rural community!

# MEMBERSHIP

The Battle River Research Association (BRRG) came into existence after the amalgamation of the Battle River Forage Association and the Battle River Applied Research Association in 1993. We are in Forestburg, Alberta, allowing us to efficiently serve the east-central region of Alberta.

We serve the counties of Paintearth, Stettler, Beaver, and Flagstaff. The Battle River Research Group has three programs to help serve the local producer, including the field Crops Program forage program, extension & Environmental Program.

BRRG Free Membership is open to agricultural producers or other agricultural stakeholders outside East Central Alberta interested in the Association's objectives. Visit **battleriverresearch.com** to Become a Member.

Battle River Research Group

www.battleriverresearch.com

# OUR BOARD MEMBERS

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Reeve and Councilor
County of Paintearth, Alberta

**Edmund Lefsrud**
Farmer and Seed Grower
North of Viking, Alberta

# OUR STAFF

**Khalil Ahmed PhD., PAg**
Manager & Communication Manager

**Nasima Junejo PhD., PAg.**
Research Program Manager

**Dona Stoddart**
Payroll & Bookkeeper

**Alexander Olson BSc.**
Field Coordinator

**Karin Lindquist**
Extension Environment Agrologist

# SUMMER STUDENTS

# HOT & COLD

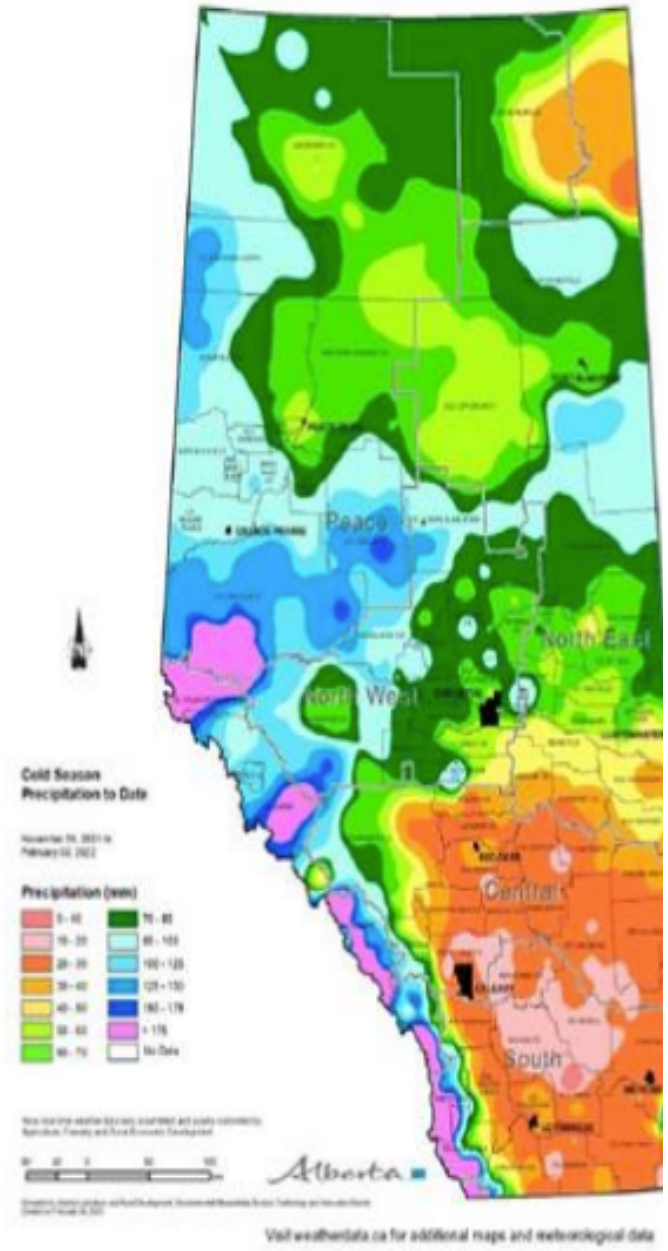
**Unpredictable Weather Conditions and Battle River Research Group**

Alberta weather has always been unpredictable; it can go from a freezing snowstorm to a warm sunny day in just a matter of days. Farmers of Alberta are no strangers to these drastic weather changes; however, they must depend on it for their livelihood. The weather decides the soil moisture levels, which is responsible for producing good quality crops; when not ideal, it can have enormous agricultural and economic consequences.

Since 2019 the soil moisture in Alberta has been inconsistent. In 2020, farmers faced a wet summer. 2021 brought extreme heat and drought. Two extreme weather conditions one after another, leaving the lands vulnerable and lacking any balance. Farmers are hopeful for 2022; however, it does not look promising with winter already turning into spring halfway through February.

The latest weather reports that southern Alberta's parts are experiencing once in 12-25-year lows, with small pockets trending to once in 50-year lows. Some of these lands have received less than 10 mm of moisture since November 1.

The moisture from 2020 did give an excellent start to the crops in the springtime. Still, with heatwave followed by a dry fall in 2021. Alberta farmlands would have needed twice the precipitation in 2022 to recover from last year's drought.

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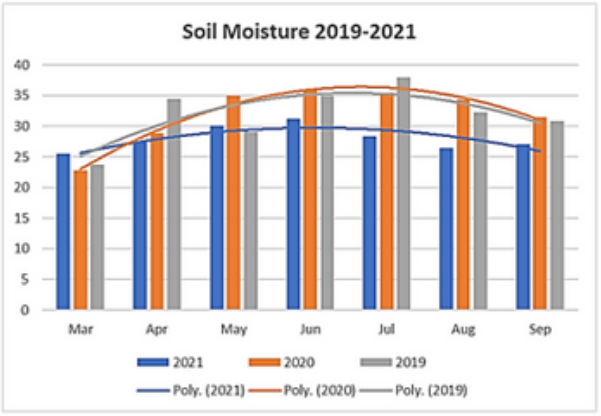



FIGURE 1 SOIL MOISTURE % AT BRRG SITES (2019-2021)

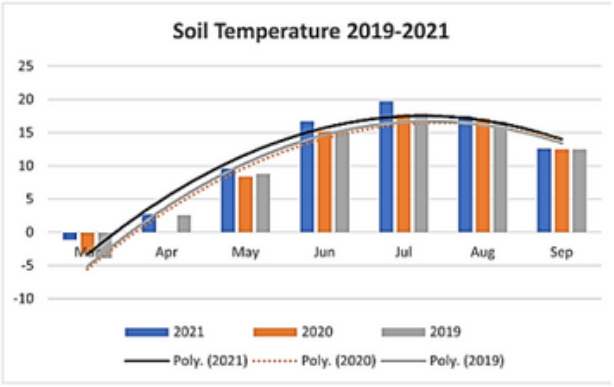



FIGURE 2. SOIL TEMERATUER (CELCIUS) 2019-2020 AT BRRG SITES

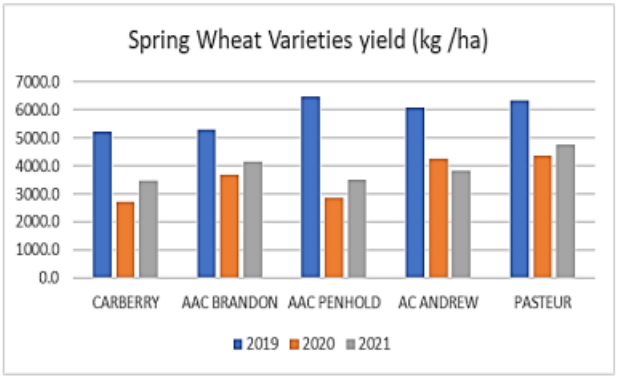



FIGURE 3 YIELD OF LOCAL WHEAT VARIETIES 2019-2020 @BRRG MULTIPLE-YEAR PROJECTS SITES

In 2021, the weather changes affected farmers' fields and research sites. The weather changes affected our research sites in 2020 and 2021 in two different ways. 2020 was wet at BRRG sites due to excess moisture, hail, and diseases such as fusarium and root rot. However, in 2021 when the group was prepared to control the disease, we experienced high heatwaves. The higher temperature left the crops physiologically stressed and under unstable growth conditions. The pulses matured earlier than average and started to shatter.

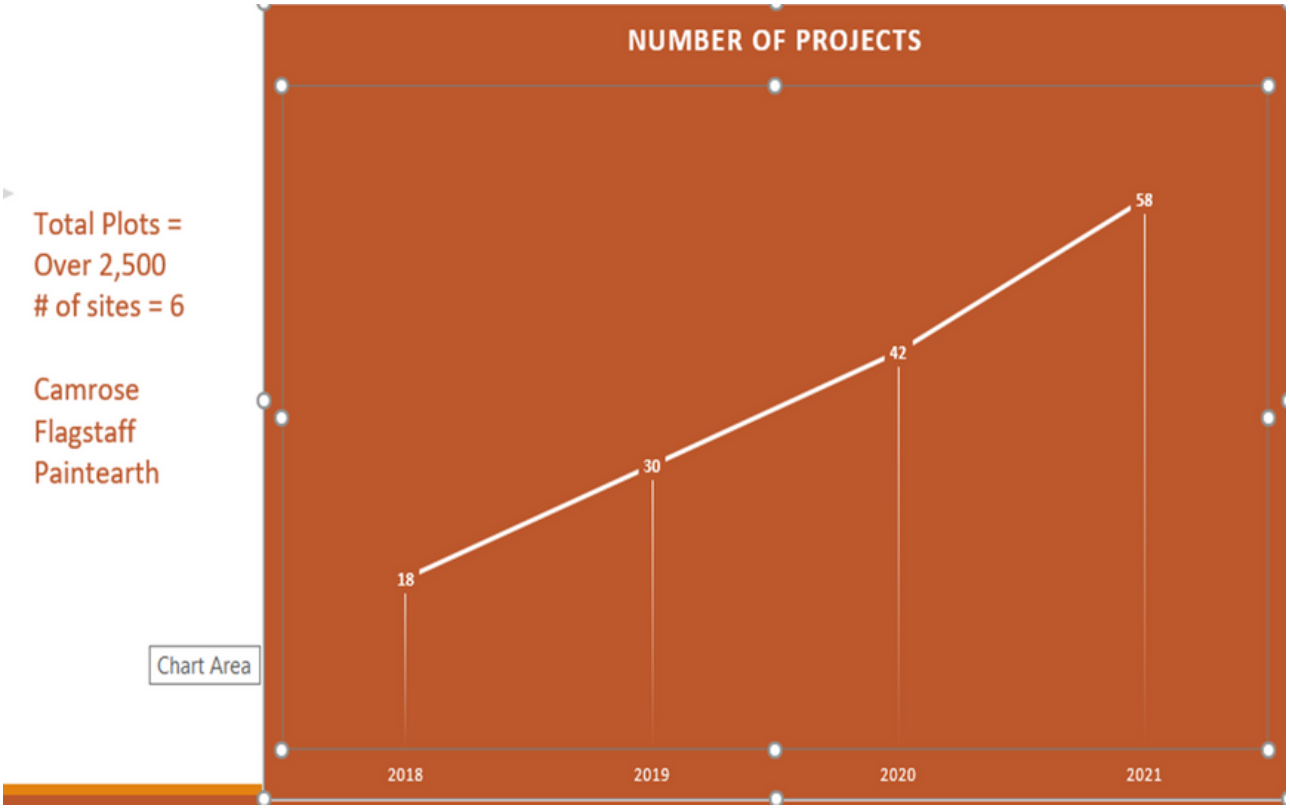
Soil moisture levels have depleted drastically since the ideal 2019 season at BRRG sites" - Khalil Ahmed, Manager, BRRG. BRRG is dedicated to coming up with solutions to help Alberta farmers cope with these weather changes; the organization is starting three new projects in 2022 to address the drought issue. RDAR funds these projects, and the organization receives financial support from member municipalities. The projects are as follows;

1. The inclusion of cover crops in traditional cropping systems to retain soil moisture:
2. Winter and fall cereals for silage use to deal with forage shortage.
3. Performance of nine wheat varieties about topography and temperature variations.

In this project, BRRG will be using spatial variable mapping and drone sensors technology to collect data from their research sites. Although we can not control the weather conditions, Battle River Research Group hopes to find some answers to the one question every Alberta farmer is asking this year "how do I put up with this weather?".

Total Plots =
Over 2,500
# of sites = 6

Camrose
Flagstaff
Paintearth




Battle River Research Group

## Upcoming events

- AGM March 21
- Mental Health with Lesley Kelly March 21
- Ag Day in Brownfield School March 24
- Field Day (July 2022)
- Crop walk (Month of July & August)
- Newsletters ( May and November 2022)
- Specialist on Call series ( January , March, April, October, November)

## New Projects

- Solutions for Climate Variability and Adaptability. Use of Innovative Cropping Systems to Improve Soil Water Holding/Drainage Capacity (NPARA)
- Winter Cereal Project with CARA
- Quantification of the impacts of excess heat and water stress on wheat genotypes at variable topographies by using Drone technology (BRRG and Premium Ag)

# APPLYING HUMALITE FOR ENHANCING WHEAT AND CANOLA PRODUCTION AND SOIL HEALTH

Humalite is a naturally occurring substance containing organic matter, high concentrations of humic acid, and low heavy metals due to its unique freshwater depositional environment. Large deposits of this product are in the holdings of Prairie Mines and Royalty ULC (PMRU) southeast of Hanna, Alberta. One of the main challenges of current agricultural practices is low nutrient use efficiency by crops (e.g., nitrogen) due to the loss of nutrients by leaching, denitrification, and volatilization. Previous research has shown that inorganic fertilizer treated with humic acid can significantly improve the soil nutrient availability and fertilizer use efficiency, nutrient uptake, root growth, shoot growth, nutritional quality, and yield.

Therefore, the objectives of this project are to (1) Evaluate the effect of different humalite application rates on wheat and canola yield/quality; (2) Determine ideal application rates of humalite in wheat and canola production systems; (3) Evaluate the effects of different humalite application rates on nitrogen use efficiency in different soil zones and plant nutrient uptake; and (4) Assess the effects of humalite on soil health parameters. The goal is to identify the ideal application rate for humalite, and fertilizer quantifies how these rates affect yield in wheat and canola and the short-term effects on soil health.

The experiment was conducted at four different locations in Alberta. Here we are just presenting the Battle River Research group site results. The site is located at Galahad. CWRS Wheat Cultivar AAC Brandon was seeded as a first-year test crop. Five humiliate application rates: 0, 100, 200, 400 & 800 pounds per acre and three nitrogen fertilizer (urea) application rates: zero, and ½ the recommended rates and recommended rates were applied in on wheat. The humalite to be used have a particle size within 0.04 to 0.25 inches. Each treatment combination was replicated four times. Baseline composite soil samples, representative of each site, were collected for soil chemistry and selected biological and physical parameters. Crop height and leaf chlorophyll will be measured at flowering, while yield and grain quality parameters will be assessed at harvest in all treatment combinations. The soil test fertilizer rates for N:P: K was 63:10:15 lbs/acre.

The first-year results somewhat impacted by high temperature and low rainfall in 2021. However, some significant differences were observed in the grain yield within the combination of the treatments as shown in Table 1.

This is an ongoing project. The results on soil health and other parameters will be concluded at the end of the experiment (2022 December). Keep in touch for updated information

# HUMALITE

| TABLE 1: Effect of humalite application and Nitrogen Rates on Grain yield of wheat | | | |
|---|---|---|---|
| # | TREATMENTS | yield 'kg/ha | |
| 1 | 0 urea (0 H) | 3257 | de |
| 2 | 0 urea (100 H) | 3666 | bcd |
| 3 | 0 urea (200 H) | 2970 | ef |
| 4 | 0 urea (400 H) | 2420 | f |
| 5 | 0 urea (800 h) | 2890 | ef |
| 6 | 1/2 Recommended. Urea (0 H) | 3312 | cde |
| 7 | 1/2 Recommended.Urea (100 H) | 3861 | abc |
| **8** | **1/2 Recommended Urea (200 H)** | **4397** | **a** |
| 9 | 1/2 Recommended Urea (400 H) | 3403 | cde |
| 10 | 1/2 Recommended Urea (800 H) | 3427 | cde |
| 11 | Recommended Urea (0 H) | 3719 | bcd |
| 12 | Recommended Urea (100 H) | 2939 | ef |
| 13 | Recommended. Urea (200 H) | 2876 | ef |
| 14 | Recommended. Urea (400 H) | 3633 | bcd |
| 15 | Recommended. Urea (800 H) | 4073 | ab |
| **Means followed by the same letter or symbol do not significantly differ (P=.05, LSD). H stands for Humalite** | | | |


Disease Assessment
Workshop 2021 conducted at
BRRG research sites

# COMPARISON OF TRADITIONAL CROP INPUTS AND BIOSTIMULANTS APPLICATION ON WHEAT, CANOLA AND PEAS IN ALBERTA

This study compared traditional fertilizer inputs based on soil test recommendations (Traditional) with supplementary biostimulant packages (including Alpine, ATP, Penergetic, and Stoller) for their effect on crop growth and yield in wheat, field pea, and canola. Another treatment (Advanced) included seed treatment, plant growth regulators, fungicide, and traditional fertilizer inputs.

The Stoller and Penergetic treatments utilize their custom seed treatment, while the ATP and Alpine products were used in tandem with any standard commercial seed treatment. The traditional plots were seeded with untreated seeds, while the advanced plots were planted with treated ones.

Experimental trials were conducted at Lethbridge (Farming Smarter), Falher (SARDA Ag Research) and Forestburg (Battle River Ag Research) locations across brown, grey, and black soil zones in Alberta for the years 2020 and 2021, thus obtaining six site years of data for each crop.
Crop yield varied significantly across study locations (Figure 1), which is expected due to different growing conditions throughout the province. In 2021, the Forestburg location received a late-season hailstorm which may have reduced crop yields approx. 20% and erased any treatment differences from the yield.

In 2021, the Peace region (Falher location) was under extreme drought, and all crop yields were negligible (under ten bu/ac). In 2021 the Forestburg location experienced mild drought with higher temperatures; however, only the pea crops had lower yields, while canola and wheat yields were closer to normal. The Lethbridge site is irrigated, with the highest overall yields for 2020 and 2021.

We observed treatment effects for wheat yield at Forestburg 2021 and pea yield at Lethbridge 2020, Forestburg 2020, and in all site-years combined (Table 1). In Forestburg 2021, grain yields for wheat were lowest in the traditional (3363 kg/ha) and Advanced treatments (4091 kg/ha), while highest in the Alpine (4187 kg/ha a), Penergetic (4279 kg/ha a), ATP (4368 kg/ha a) and Stoller treatments (4568 kg/ha a Table 2).

Yields for the pea crop for all site years combined are shown in Figure 2. The traditional treatment has yielded the lowest (3261 kg/hab), followed by ATP (3403 kg/hab). The Stoller (3446 kg/ha ab), Penergetic (3506 kg/ha ab) and Advanced (3527 kg/ha ab) treatments yielded higher than other treatments, but the differences were not statistically significant. The Alpine biostimulant treatment in peas (3747 kg/ha a) is the only treatment so far to yield statistically higher than the traditional (check).

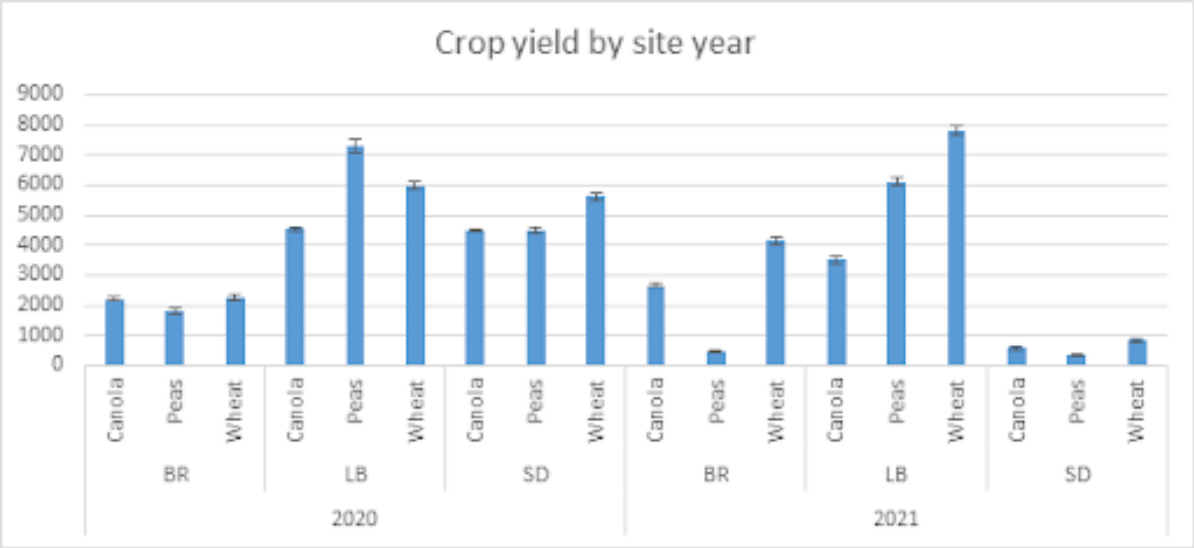



Figure 1. Crop yield at each study location for canola, peas and wheat. Battle River Research Group (BR), SARDA Ag Research (SD) and Farming Smarter (FS).

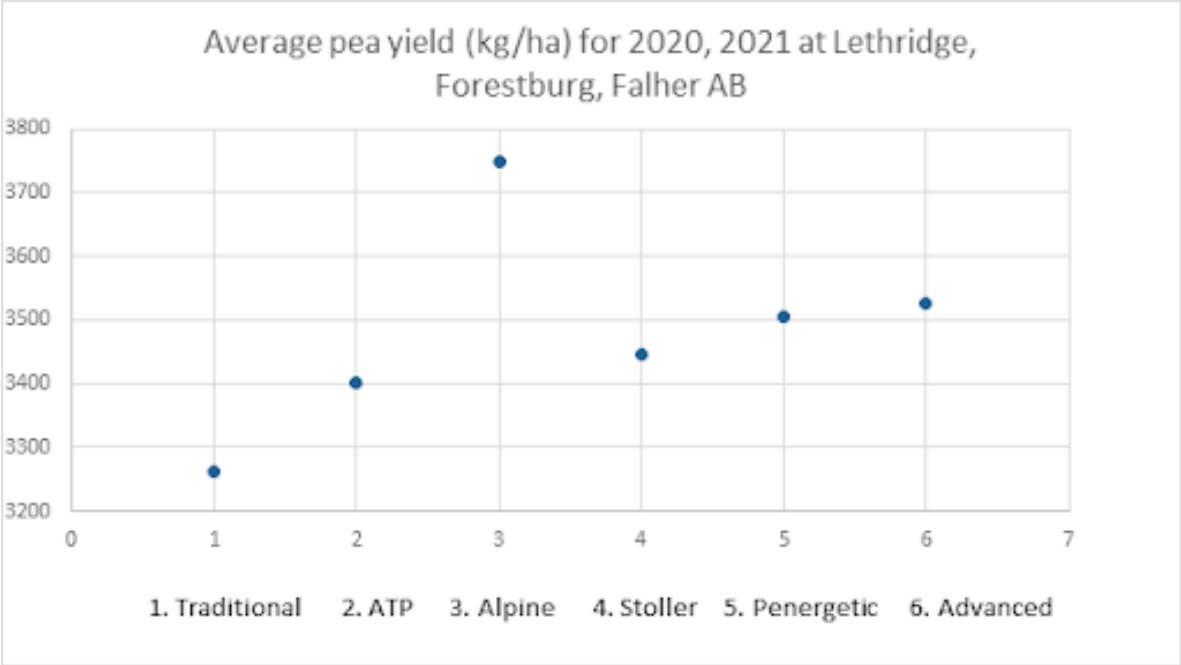



Figure 2. Average pea yield for all site-years at Lethbridge, Forestburg and Falher AB.


**Table 1. Yield summary for crops by treatment and site year. Letters represent the significant difference of Tukey-Kramer at P <0.05.**

| | | Yield (kg/ha) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Crop | Treatment | 1_LB20 | 2_SD20 | 3_BR20 | 4_LB21 | 5_SD21 | 6_BR21 | All |
| Canola | Traditional | 4712 | 4489 | 2172 | 3759 | 558 | 2578 | 3039 |
| Canola | ATP | 4550 | 4389 | 2237 | 3417 | 564 | 2606 | 2957 |
| Canola | Alpine | 4771 | 4531 | 1967 | 3518 | 603 | 3028 | 3070 |
| Canola | Stoller | 4264 | 4546 | 2364 | 3402 | 473 | 2393 | 2903 |
| Canola | Penergetic | 4413 | 4519 | 2408 | 3590 | 483 | 2948 | 3057 |
| Canola | Advanced | 4616 | 4525 | 2142 | 3483 | 463 | 2468 | 2945 |
| Peas | Traditional | **7198 ab** | 4376 | **1403 c** | 5650 | 469 | 507 | **3261 b** |
| Peas | ATP | **6496 b** | 4860 | **1976 abc** | 6415 | 340 | 360 | **3403 b** |
| Peas | Alpine | **8115 a** | 4873 | **2038 ab** | 6515 | 355 | 607 | **3747 a** |
| Peas | Stoller | **7859 a** | 4442 | **1637 bc** | 5928 | 340 | 512 | **3446 ab** |
| Peas | Penergetic | **7283 ab** | 4473 | **2292 a** | 6064 | 377 | 578 | **3506 ab** |
| Peas | Advanced | **8290 a** | 4378 | **1406 c** | 6376 | 299 | 442 | **3527 ab** |
| Wheat | Traditional | 5812 | 5750 | 2334 | 7451 | 985 | **3362 b** | 4280 |
| Wheat | ATP | 5958 | 5663 | 2411 | 8064 | 783 | **4367 a** | 4542 |
| Wheat | Alpine | 5995 | 5694 | 2495 | 7880 | 790 | **4187 a** | 4507 |
| Wheat | Stoller | 5894 | 5647 | 1924 | 7869 | 871 | **456 a** | 4459 |
| Wheat | Penergetic | 5881 | 5637 | 2030 | 8193 | 869 | **4279 a** | 4477 |
| Wheat | Advanced | 6342 | 5842 | 2324 | 8192 | 855 | **4090 ab** | 4604 |

2022 is the final field year for the planned three years for the trial. The trial design, the field locations and plot locations are in the same locations all three years as the rotation is fully phased. The same treatments are applied to each plot year after year. The only factor that will change is which crop will be seeded into the plot area (e.g. y1 Penergetic canola, y2 Penergetic pea, y3 Penergetic wheat, all in the same plot location). After the field season, we will amalgamate the quality data and summarize the results for the final report

# EVALUATION OF THE INTERACTION BETWEEN SEED SIZE AND SEEDING DEPTH ON CANOLA ESTABLISHMENT AND YIELD 2021

The small plot research was conducted to assess the interaction between seed size and planting depth on Canola emergence, establishment, and yield in Alberta. The project was funded by the Canadian Agriculture Partnership (CAP). The duration of the project is 2020-2023. The experiment was started in 2020 at several locations across Alberta's province including Forestburg, Bonnyville, and Falher. The study aims to provide producers with the ability to improve on-farm production by understanding the interaction between seed size and planting depth on Canola establishment and yield. This study proved highly beneficial in unfavorable weather conditions where increasing planting depth allowed available soil moisture to be reached in the dry season The following four seed size classes were utilized: 2.0-3.0(TKW), 4.0-4.6(TKW), 4.7-4.8(TKW), and 4.9-5.7(TKW), se four seed size classes seeded at three different planting depths: 1cm, 2.5cm, and 4 cm.The trial was laid in a randomized complete block design (RCBD) with four replications to reduce error. The appropriate fertilizer blend was applied to the research site based on a 100% soil test recommendation. Agronomic characters evaluated included measurement of total precipitation and average daily temperature recorded, soil moisture at the time of seeding, emergence assessed through ½ m2 plant counts, plant height per plot, and grain yield. In 2020, No significant differences were observed in plant emergence and plant height; however, the canola's highest yield was recorded at a depth of 2.5 cm with a seed size of 5.3 (TKW).

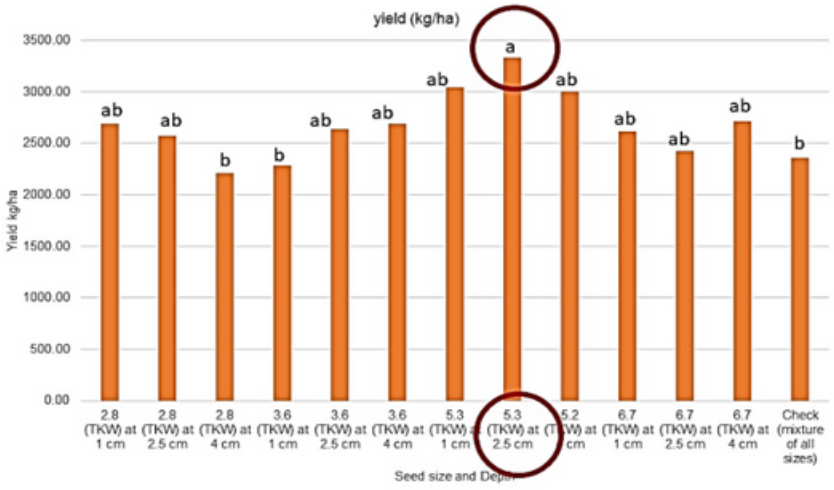



Fig 1. yield data of 2020 from Forestburg research site

The year 2021 was a drought year with high temperatures. The average rainfall was 248 mm in growing seasons. The highest yield was observed at the deeper seeding depth it may attribute to the dry weather condition and lower moisture at the top layer of the soil; however statistically no significant mean differences were found among all treatments.

TABLE 1 : YIELD DATA OF 2021 FROM FORESTBURG RESEARCH SITE

| # | Canola seed size (TKW) & depth (cm) | yield | plant emergence/m |
|---|---|---|---|
| | | kg/ha | % |
| 1 | 2.8 (TKW) at 1 cm | 2598.6 | 44 |
| 2 | 2.8 (TKW) at 2.5 cm | 2640.0 | 54 |
| 3 | 2.8 (TKW) at 4 cm | 2921.9 | 47 |
| 4 | 3.6 (TKW) at 1 cm | 2570.0 | 42 |
| 5 | 3.6 (TKW) at 2.5 cm | 2424.7 | 59 |
| 6 | 3.6 (TKW) at 4 cm | 2244.3 | 78 |
| 7 | 5.3 (TKW) at 1 cm | 2606.9 | 69 |
| 8 | 5.3 (TKW) at 2.5 cm | 2543.3 | 77 |
| 9 | 5.2 (TKW) at 4 cm | 2396.4 | 77 |
| 10 | 6.7 (TKW) at 1 cm | 2327.6 | 52 |
| 11 | 6.7 (TKW) at 2.5 cm | 2647.6 | 61 |
| 12 | 6.7 (TKW) at 4 cm | 2794.0 | 70 |
| 13 | Check (mixture of all sizes) | 2839.7 | 57 |

# COMPARING WHEAT PARAMETERS BETWEEN WHEAT SOWN ULTRA EARLY VERSUS NORMAL SEEDING PERIOD RANGES UNDER DIFFERENT SEEDING RATES AND WHEAT VARIETIES

## INTRODUCTION:

The growing season in the North Peace region of Alberta is short, which makes time to sow and harvest a race against the clock. Wheat growers could benefit should they decide to seed earlier than the expected date as this may improve certain stages such as heading and ripening (He et al. 2012). It has been found that as long as the ground is between 2-6°C, wheat can be sown and produce commendable yields compared to wheat stands sown within the normal seeding range periods (usually when soil temperatures are between 10 to 12°C).

The hypothesis of this experiment was that yield, thousand kernel weight (TKW), test weight and protein content will be as great in wheat stands sown as soon as the ground is 2°C as those stands sown in normal seeding periods, which around the first to second week of May.

Consequently, the objective is to compare yield, TKW, test weight and protein content in AAC Brandon and AAC Connery wheat variety stands sown at different seeding rates (200, 300 and 400 seeds m-2) on two instances 1) when the soil is at a minimum temperature of 2°C and 2) at a soil temperature between 10 to 12°C.

## MATERIALS AND METHODS:

The experiment was carried at different research organizations across the province of Alberta (Table 1). A randomized complete block design was set using three factors 1) Seeding date, 2) seeding rate and 3) wheat variety. Seeding dates are “early” (soil temperature is at a minimum of 2°C) and “normal” (soil temperature is 10-12°C or 10 to 14 days after the “early” date). Three seeding rates were selected: a suboptimal (200 seeds m-2), intermediate (300 seeds m-2) and optimal (400 seeds m-2). Moreover, AAC Brandon and AAC Connery were selected as two of the most commeon wheat varieties grown in Western Canada.

The experimental design was separated by seeding dates and sown in 1.5 X 7m plots Soil samples were collected before seeding for chemical analysis and fertilizer recommendations. Fertilizer was applied at 150 lb ac-1 Weed control before seeding was conducted using glyphosate accompanied by a pre-emergent herbicide depending of the degree of weed infestation. Plots were maintained through the growing season for weed management using and fungicide was applied pathogens where necessary.

Harvest was conducted using a Wintersteiger Nursery Master Plot Combine (Wintersteiger 1997). Test weight for oat was obtained using a Smart scoop (Dimo's Labtronics 2004) digital bushel weight scale. Moisture content to correct for yield was taken using a Mini GAC Grain Analysis Computer (Dickey-John 2017) whereas field pea percentage moisture content was taken using a TY16060 Moisture Chek (John Deere 1995). The yield was thus computed as bu ac-1.
Statistical analysis was computed as an ANOVA and performed through SAS 9.4 (SAS institute 2008) by using PROC MIXED for yield, test weight and TKW. For the mixed procedures, fixed effects were seeding date, seeding rate and wheat variable and their respective interactions such as seeding date*seeding rate, seeding date*wheat variable, seeding rate*wheat variable and seeding date*seeding rate*wheat variable. Random effects were the year, site, and the number of replicates, as well as their interactions such as year*block year*site block*site year*block*site. Variables for this experiment were yield (bu ac-1), TKW (1000 kernels g-1), and test weight (
bu/ac).

Percentage (%) of protein content on the other hand was analysed using PROC GLM with the nearest-neighbour approach as normality and R-squared values were higher compared to those values obtained from PROC MIXED. Effects considered were blocks, treatment (each treatment being an interaction of the three factors tested), as well as covariance among blocks and among plot columns.

**Table 1**. Location coordinates, seeding and harvesting dates of AAC Brandon and AAC Connery wheat varieties at early (soil temperature 2-6°C) and normal (soil temperature 10-12°C) dates

| *Organization* | Coordinates | Early | | Normal | |
|---|---|---|---|---|---|
| | | Seeding | Harvest | Seeding | Harvest |
| Battle River Research Group | 52° 34' 43.62" -112° 3' 46.60" | April 13, 2019<br>April 29, 2020<br>April 27, 2021 | September 2, 2019<br>September 8, 2020<br>August 30, 2021 | May 14, 2019<br>May 20, 2020<br>May 13, 2021 | September 2, 2019<br>September 22, 2020<br>August 30, 2021 |
| Chinook Applied Research Association | 51° 21' 12.70" -110° 28' 21.69" | April 8, 2019<br>April 28, 2020<br>April 27, 2021 | August 29, 2019<br>August 20, 2020<br>August 9, 2021 | May 13, 2019<br>May 14, 2020<br>May 13, 2021 | October 6, 2019<br>September 4, 2020<br>September 1, 2021 |
| Gateway Research Organization | 54° 9' 19.45" -113° 52' 45.64" | April 17, 2019<br>May 5, 2020<br>April 19, 2021 | September 2019<br>September 17, 2020<br>August 9, 2021 | May 8, 2019<br>May 20, 2020<br>May 5, 2021 | October 2, 2019<br>September 29, 2020<br>August 25, 2021 |
| Lakeland Applied Research Association | 54° 18' 44.54" -110° 37' 1.39" | April 12, 2019<br>April 20, 2019<br>April 26, 2021 | September 16, 2019<br>September 22, 2020<br>September 8, 2021 | May 13, 2019<br>May 13, 2020<br>May 13, 2021 | October 1, 2019<br>September 28, 2020<br>September 9, 2021 |
| Mackenzie Applied Research Association | 58° 23' 5.42" -116° 2' 18.28" | April 26, 2019<br>May 11, 2020<br>May 14, 2021 | September 3, 2019<br>September 22, 2021<br>September 14, 2021 | May 9, 2019<br>May 21, 2020<br>May 25, 2021 | September 11, 2019<br>September 22, 2021<br>September 16, 2021 |
| North Peace Applied Research Association | 56° 55' 17.54" -117° 37' 59.46" | April 11, 2019<br>May 12, 2020<br>May 6, 2021 | October 11, 2019<br>September 28, 2020<br>September 22, 2021 | May 7, 2019<br>May 18, 2020<br>May 20, 2021 | October 11, 2019<br>September 28, 2020<br>September 22, 2021 |
| Smoky River Applied Research and Development Association | 55° 43' 50.54" -117° 12' 9.79" | April 23, 2019<br>April 28, 2020<br>May 12, 2021 | October 3, 2019<br>September 15, 2020<br>August 11, 2021 | May 8, 2019<br>May 26, 2020<br>May 12, 2021 | October 3, 2019<br>October 6, 2020<br>August 11. 2021 |

## RESULTS & DISCUSSION:

**Table 2.** P values computed from fixed effects impacting yield, test weight and thousand kernel weight (TKW) in AAC Brandon and AAC Connery wheat varieties sown at 200, 300 and 400 seeds $m^{-2}$ at "early" and "normal" seeding dates

| Parameter | Yield lb $ac^{-1}$ | test weight kg $hL^{-1}$ | TKW 1000 $g^{-1}$ |
|---|---|---|---|
| *Effect* | | | |
| seeding time (early vs normal) | **0.0003** | **0.0009** | **0.0001** |
| wheat variety (AAC Brandon vs. AAC Connery) | **0.0001** | **0.0001** | **0.0004** |
| seeding rate (200 vs 300 vs 400 seeds $m^{-2}$) | **0.0043** | 0.3383 | 0.6561 |
| seeding time X wheat variety | 0.5801 | 0.1952 | 0.1429 |
| seeding time X seeding rate | 0.1782 | 0.7251 | 0.5970 |
| wheat variety X seeding rate | 0.2401 | 0.8470 | 0.3183 |
| seeding time X wheat variety X seeding rate | 0.7008 | 0.6212 | 0.7538 |

**Table 3.** Wheat parameter values in AAC Brandon and AAC Connery wheat varieties sown at 200, 300 and 400 seeds $m^{-2}$ at "early" and "normal" seeding dates

| | | Yield bu $ac^{-1}$ | | Test weight kg $hL^{-1}$ | | TKW g | |
|---|---|---|---|---|---|---|---|
| Time of seeding | Early | 54.86[z] | B[y] | 77.16 | B | 37.91 | B |
| | | 6.8 | | 1.2 | | 1.5 | |
| | Normal | 56.88 | A | 77.80 | A | 38.75 | A |
| | | 6.8 | | 1.2 | | 1.5 | |
| Wheat variety | AAC Brandon | 58.16 | A | 78.36 | A | 38.63 | A |
| | | 6.8 | | 1.2 | | 1.5 | |
| | AAC Connery | 53.58 | B | 76.61 | B | 38.02 | B |
| | | 6.8 | | 1.2 | | 1.50 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Seeding rate seeds $m^{-2}$ | 200 | 54.59 | B | 77.28 | A | 38.44 | A |
| | | 6.8 | | 1.2 | | 1.5 | |
| | 300 | 56.66 | A | 77.58 | A | 38.28 | A |
| | | 6.8 | | 1.20 | | 1.5 | |
| | 400 | 56.35 | A | 77.58 | A | 38.26 | A |
| | | 6.8 | | 1.2 | | 1.5 | |

zα=0.05 N=48 Different letters mean significance among treatments

## YIELD:

Yield was impacted by seeding time, variety and seeding rate individually (Table 2). Greater yields were found when wheat was sown at soil temperatures between 10-12°C than when sown earlier at soil temperatures between 2-6°C (Table 3); AAC Brandon produced more yield than AAC Connery and seeding rates of 300 and 400 seeds m-2 produced more yield than plots sown at 200 seeds m-2 (Table 3). This differs from results found by Collier et al. (2021) where yield seemed to have decreased at later dates due to an increase in protein content.

The soils in the Northern Peace are mostly a silt loam with a subsoil composed of heavy clay. At temperatures where de soil is just above 0°C, the trench in which the side is placed may not close properly. Thus, the seed will not be completely and hence unable to germinate.

This effect is accentuated even more if no-till practices are conducted. He et al. 2019 agree that snow cover and water content in the soil can not only limit equipment access for seeding but also create constraints after such a process has been performed in the field. At temperatures above 10°C, the soil is drier and hence it can be manipulated with ease by the seeder. He (2019) and colleagues modelled the yield based on certain seeding dates and environmental conditions and concluded that along with seeding dates, as well as moisture, and temperature in the soil. It is possible that precipitation happening at normal seeding dates but not at early seeding dates may have helped with faster germination and increase yield by the end of the season. In addition, an increased temperature in periods of grain filling may have also contributed to greater yield at normal seeding dates (Collier et al. 2020)

## TEST WEIGHT AND THOUSAND KERNEL WEIGHT:

Seeding time and wheat variety affected test weight and TKW (Table 2). In contrast, test weight and TKW were statistically the same at all seeding rates. Similarly, interaction effects had no influence on test weight and TKW values across treatments (Table 2). Our results indicated that test weight and thousand kernel weight were greater in stands sown at normal seeding dates compared to those sown earlier in the season (Table 3).

Collier et al. (2021) had similar results with thousand kernel weight, but test weight was not significant. As such, thousand kernel weight did increase at later dates, but test weights were the same regardless of when the wheat was planted. Moreover, Collier et al. (2021) found that greater seeding rates were more influential in thousand kernel weight compared to wheat varieties.

## PROTEIN CONTENT:

None of the treatment factors impacted protein content (P=0.9577). Results resemble those found in Collier et al. 2020 but not Collier et al. 2021. Collier et al. (2021) found that protein content was greater in stands sown earlier than those sown at soil temperature between 10-12°C.

## CONCLUSION:

Yield, test weight and TKW were affected by seeding date and variety. Yield in addition was also affected by seeding rate. Protein content in contrast was not impacted by any of the effects tested. It is possible our results have differed from previous studies likely due to mechanical side effects occurring at planting.

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Collier G.R.S., Spaner D.M., Graf R.J. and Beres B.L. (2021) Optimal agronomics increase grain yield and grain yield stabilioty of ultra early wheat seeding systems. Agronomy 11(2) 240-260

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# EVALUATION OF HEMP AS FORAGE IN CENTRAL ALBERTA

**Introduction:**

Livestock producers are always searching for alternatives to silage crops. Fortunately, Farm Bill 2018 allowed the growing of long-forbidden hemp crops on their farms in the United States of America. After a two-year feasibility study was completed, hemp has been given the go-ahead in 40 states (www.drovers.com). In Canada, back in 1998, Saskatchewan researchers tested hemp with chicken meal as ruminant feed and proved it to be a suitable replacement for other ruminant feedstuffs. Later, another research conducted by University of Saskatchewan researchers revealed that hemp seed is a good source of protein as a cattle feed (Gibb et al., 2005). In Alberta, hemp was tested as an industrial crop in different regions of the province. However, hemp has not yet been tested as a forage crop in the province. This study, therefore, is designed to achieve the following objectives:

1. To evaluate the fiber, seed, and dual-purpose hemp varieties for forage production in east-central Alberta
2. To find out the best forage -hemp growth stage for cattle production in east-central Alberta
3. To analyze the THC levels at the different growth stages of hemp varieties
4. To conduct the extension activities for hemp forage production in east-central Alberta

**Methodology:**

In 2021 the hemp trials were established at two research sites located at Flagstaff County and Killam. Each trial was established in a randomized block design (RCBD) with four replications. Seeding rates were calculated according to KTW and germination % of each variety seed and seeded at ½ inch depth. Three dual-purpose hemp varieties (X59, CRS-1, Joey) were seeded as test hemp varieties. The plots were seeded on 15 May 2021 at Galahad Flagstaff county and 17 May 2021 at Killam Paintearth county. The fertilizer was applied based on soil test recommendations for hemp (N:P:K:S = 135:20:25:5). Data on plant emergence, plant heights, and the yield of each variety at each cut were recorded (see Results: Table 1) during the growing season. The plants were cut three times (29 June, 21 July, 18 August) at three different growth stages to compare feed quality and THC.

Then, the plant samples were sent away for nutritional analysis and THC levels. The statistical analysis collected was done by ARM software.

**Results:**

Overall, the nutritional data from both plots in Flagstaff County and Paintearth County reveals that hemp is an excellent source of protein for livestock. Most of the crude protein levels are comparable to that of dehydrated or suncured alfalfa pellets or cubes, or pure alfalfa hay. Energy values (TDN = Total Digestible Nutrients) are also comparable to good-quality hay.








Macro-minerals also make hemp an excellent source of calcium and magnesium, two main minerals that are important for body maintenance and reproduction. Of the three varieties tested, our research showed that X59 is the most satisfactory variety for use as livestock forage, followed by CRS-1 and Joye. However, the difference in results from the the plots placed in two different locations also show that certain varieties do better than expected. Joye, in the Paintearth plot, fares better nutritionally than CRS-1, and is comparable to X59. It should be noted that the Paintearth hemp plots experienced significant damage as a result of a hail storm during July 2021, which significantly affected the yield—and most likely the nutritional data as well—obtained here.

It should be noted that, from other research done in Canada, the United States, and in other parts of the world, that hemp would be more valuable as a supplement than a feed replacement for other dominant and popular feeds, due to concerns with THC content that are under heavy federal regulations.

However The total THC and CBD levels were reported 0.05 %. these levels are lower than 0.3 %LOQ (standard legal CBD % required in Alberta) in all three varieties samples of both research sites, as shown in the table. Therefore, lower THC levels make the crop suitable for forage purpose.
Table: Table 2. The level of quantification (LOQ) of hemp plants,harvest

| Varieties | Total CBD LOQ % | Total THC LOQ % |
|---|---|---|
| CRS-1 | 0.05 | 0.05 |
| Joey | 0.05 | 0.05 |
| X59 | 0.05 | 0.05 |

***LOQ=limit of quantification**

The leaves and flower-heads of hemp provide a good source of animal nutrition, however, the stems are extremely fibrous and will cause gut compaction issues if directly fed to ruminants (sheep, goats, beef & dairy cattle). The following are our observations and interpretation of the data we obtained from our two hemp plots.

Hemp Staging Forage Trial 2021 – Flagstaff County Plots

| Harvest #1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Yield | Feed Nutrition % | | | | | |
| Varieties | tons/acre | CP | TDN | Ca | P | K | Mg |
| X59 | 1.78 | 23.89 | 68.73 | 3.243 | 0.235 | 3.648 | 0.773 |
| CRS-1 | 2.14 | 15.015 | 60.073 | 2.47 | 0.205 | 2.47 | 0.43 |
| Joye | 1.95 | 13.435 | 56.703 | 1.668 | 0.265 | 1.668 | 0.368 |
| **Harvest #2** | | | | | | | |
| Varieties | Yield | Feed Nutrition % | | | | | |
| | tons/acre | CP | TDN | Ca | P | K | Mg |
| X59 | 4.03 | 24.235 | 69.353 | 3.363 | 0.25 | 3.363 | 0.775 |
| CRS-1 | 5.12 | 16.995 | 62.25 | 2.623 | 0.23 | 2.623 | 0.485 |
| Joye | 4.98 | 9.758 | 52.773 | 1.505 | 0.188 | 1.505 | 0.28 |
| **Harvest #3** | | | | | | | |
| Varieties | Yield | Feed Nutrition % | | | | | |
| | tons/acre | CP | TDN | Ca | P | K | Mg |
| | | % | % | % | % | % | % |
| X59 | 12.53 | 24.178 | 69.403 | 3.32 | 0.243 | 3.32 | 0.72 |
| CRS-1 | 11.62 | 15.625 | 61.668 | 2.728 | 0.218 | 2.728 | 0.458 |
| Joye | 8.85 | 12.335 | 57.765 | 1.683 | 0.248 | 1.683 | 0.358 |

Of interest in the Flagstaff County, hemp plots are the consistency in quality that X59 maintained with all three harvests. This variety maintains an average of 24% crude protein and 69% TDN throughout the year, which points to its ability to provide an excellent source of feed for livestock. Comparably, CRS-1 proves to be lower in quality, and Joye less so. This is through a growing season that provided insufficient moisture for most plants, making the year a drought year. A week of intense heat was also experienced at the end of June. It is likely one or more varieties of this plot may have suffered as a result, giving lower quality forage as evident in the second cut. Better growing conditions, while still primarily moisture deficient, may have helped improve nutritional quality as evidenced by the third harvest.

**Hemp Staging Forage Trial 2021 – Paintearth County Plots**

| Harvest #1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Varieties | Yield | Feed Nutrition % | | | | | |
| | tons/acre | CP | TDN | Ca | P | K | Mg |
| X59 | 6.20 | 25.395 | 71.253 | 3.948 | 0.24 | 3.52 | 0.733 |
| CRS-1 | 5.61 | 25.89 | 70.573 | 3.915 | 0.258 | 4.08 | 0.738 |
| Joye | 3.67 | 26.075 | 71.303 | 3.8 | 0.268 | 4.01 | 0.74 |
| **Harvest #2** | | | | | | | |
| Varieties | Yield | Feed Nutrition % | | | | | |
| | tons/acre | CP | TDN | Ca | P | K | Mg |
| X59 | 11.15 | 18.313 | 64.378 | 2.343 | 0.198 | 2.675 | 0.47 |
| CRS-1 | 8.36 | 18.508 | 63.618 | 2.19 | 0.195 | 2.713 | 0.468 |
| Joye | 7.14 | 17.218 | 65.118 | 2.323 | 0.195 | 2.928 | 0.46 |
| **Harvest #3** | | | | | | | |
| Varieties | Yield | Feed Nutrition % | | | | | |
| | tons/acre | CP | TDN | Ca | P | K | Mg |
| X59 | 6.91 | 13.018 | 57.168 | 1.283 | 0.29 | 1.573 | 0.398 |
| CRS-1 | 7.58 | 9.745 | 54.81 | 0.978 | 0.223 | 1.22 | 0.315 |
| Joye | 6.80 | 13.513 | 61.195 | 1.39 | 0.295 | 1.545 | 0.458 |

As noted in the summary above, the Paintearth County hemp plots experienced a devastating hail storm in July, which significantly impacted yield, and most likely the resulting quality of the plants. However, as opposed to the aforementioned Flagstaff County hemp plot results, the variety Joye appeared to have thrived better than either X59 and CRS-1, respectively. As with the Flagstaff plots, the Paintearth plots also experienced abnormally low precipitation and a week of intense heat, which impacts yield and nutritional quality. The overall quality of these plots is comparable to good quality alfalfa-grass hay, with nutritional quality declining after being damaged by the hail storm, the period[s] of high heat, and lack of moisture.

# ANNUAL SILAGE TRIAL-2021

Silages are a vital feed component for cattle producers in Alberta and all around the globe. As an essential feed source, the farmer needs to understand what silage is good to grow according to their region's ecosystem. Therefore, the annual silage trial is established to determine the adaptability of silage varieties and alternative silage crops in central Alberta.

2021 was the 2nd year of the project establishment. The trials were seeded at the Galahad, AB research sites of BRRG. The trials include a variety of testing trials of silage oat, barley, triticale, winter/ spring cereal mix, cereal/pulse mix, and alternatives (hybrid rye, forage radish, chicory, brassica, forage turnip, forage kale, millet, sorghum Sudan grass, phacelia, plantain).

The experiments were laid out in RCBD (randomized complete block design), assigned with four replications. Pulse and canola stubble was used for seed, Regional Oats and Triticale trial was seeded on pea stubble. Cereal pulse mixes, winter-spring /cereal mix, and Alternatives were seeded on pea's stubble. Trails were seeded in groups; cereal pulse mix and winter-spring/cereal mix were seeded on May 26, 2021. Whereas oats and Triticale were seeded on May 27, 2020, an alternative silage trial was seeded on May 21, 2021.

The treated seed was used for seeding. Recommended package and practices were followed for each trial; Soil test recommended fertilizer rates were applied at seeding time (N:P: K =63:10:15 lbs/ac).

Glyphosate was used as a Pre-seed burn-off in all experimental trials. In crop, herbicide was also applied in some trials as per crop type and trial requirement.

Several data were collected on each trial, total precipitation was 213mm in the growing season, and temperature recorded 35.8 centigrade as maximum from May to August 2021.

For explanations on data summarization methods and other information, comparison of yield and feed nutritional values are expressed in tables. Feed samples of each trial were sent to the lab for quality analyses, including CP (crude protein), TDN (total digestible nutrients), Ca (calcium), P (phosphorous), K (potassium), and Mg. (magnesium). The actual yield is expressed in kg/ha, and the feed nutritional values are calculated in percent (%) on a dry matter % basis.

Dry Matter (DM, %) refers to the moisture-free content of the forage sample. The water content of forage will dilute nutrients yet doesn't usually significantly impact animal intake.

Therefore, it's essential to balance all rations on a dry matter basis. The daily intake of beef cattle will be ~2%-2.5% of body weight on a dry matter basis. Moisture contents outside of expected ranges can indicate potential spoilage issues. Wet silages (>40% DM) may not ensile well, leading to heating, clostridia, listeria contamination, or excessive aerobic losses and spoilage.

| AGRONOMIC DETAILS | | |
|---|---|---|
| **PARAMETER** | **DESCRIPTION** | |
| **Year** | | 2021 |
| **Location** | | Galahad, AB |
| **Harvesting dates** | | |
| | Silage Barley | 08/13/21 |
| | Silage Oats | 08/05/21 |
| | Silage Triticale | 08/13/21 |
| | Silage Pulse Mix | 08/03/21 |
| | Silage Spring fall Mix | 08/09/21 |
| **Seeding Date** | | |
| | Silage Pulse Mix and Spring -Fall mix | 05/26/2021 |
| | Silage Barley | 05/26/2021 |
| | Silage Oats | 05/27/2021 |
| | Silage Triticale | 05/27/2021 |
| **Plot Area(sq.m)** | Area of plots in sq. (Required for conversion factor) | 7 |
| Fertilizer applied | | N:P:K 63:10:15 lbs/ac |
| Herbicides applied | | Glyphosate, Steller XL, Axial |
| Precipitation (mm) | | 213mm |
| **Design** | Design of plot plan | RCBD |

**Table1. Below defines the range for yield category, provided in kg per hectare (source: Alberta seed guide). Silage crops are reported as average yields in Low, Medium, and High in Alberta. This allows for comparison with the check when growing conditions, target yields are anticipated to be of low, medium, or high productivity.**

| Crop | Low (kg/ha) | Medium (kg/ha) | High (kg/ha) |
|---|---|---|---|
| **Oats** | < 19770 | 19770 - 27180 | >27180 |
| **Triticale** | <24710 | 24710 - 30888 | >30888 |
| **Barley** | <20175 | 20175 - 26900 | >26900 |
| **Pulse mixture** | <19770 | 19770 – 24710 | >24710 |

**Table2. Below defines the average range for feed nutritional value in different type of silages, the average quantity is described in percent (source: Alberta seed guide and Peace country beef & forage association).**

| Nutrient and Mineral | Normal Range % |
|---|---|
| Crude Protein | 10-19 |
| Total digestible nutrient (TDN) | 54-64 |
| Calcium (Ca) | 0.6-1.5 |
| Phosphorus(P) | 0.17-0.33 |
| Magnesium (Mg) | 0.1-0.4 |
| Potassium(K) | 0.5-4.7 |

# ALTERNATIVE SILAGES-2021

| Regional Silage Alternatives 2021 | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Variety tested in 2021 Trials (yield and Nutritional data only comparable to CDC Baler)* | | | | | | | |
| **Varieties** | **Yield** | **Feed Nutritional %** | | | | | |
| | **t/ac** | **CP** | **TDN** | **Ca** | **P** | **K** | **Mg** |
| CDC Baler | **100.0** | **100** | **100** | **100** | **100** | **100** | **100** |
| Chicory | 110 | 110.9 | 102 | 88 | 128 | 95 | 116 |
| Forage Brassica | 85 | 111.4 | 102 | 82 | 116 | 93 | 105 |
| Forage Kale | 103 | 111.6 | 102 | 78 | 124 | 89 | 116 |
| Forage Radish | 95 | 109.7 | 102 | 90 | 112 | 95 | 100 |
| Forage Turnip | 113 | 105.4 | 101 | 84 | 116 | 98 | 105 |
| Double max radish | 116 | 113.7 | 116 | 90 | 108 | 91 | 105 |
| Millet | 147 | 105.9 | 101 | 90 | 120 | 93 | 116 |
| Phacelia | 57 | 119.9 | 107 | 96 | 120 | 90 | 105 |
| Plantain | 72 | 108.2 | 102 | 86 | 100 | 95 | 105 |

The different species of alternative forages have different planes of nutrition. Some provide higher amounts of protein and energy than others, whereas other species are most noted for retaining high amounts of other nutrients, like macro- and micro-minerals within their tissues.

Chicory, plantain, and phacelia are examples, as noted in a recent paper by Omokayne et. al. (2021). Brassicas and radish species are best noted for being nitrogen scavengers, and typically retain high nutritive values at harvest. Vegetative brassica and radish plants, when harvested (or grazed), tend to have higher energy and protein contents than when they're mature.

It is unusual to see that grasses have a high Ca:P ratio, as the average ratio is at around 1:1. The high mineral, protein, and energy values of the warm-season grasses (millet and sorghum-sudangrass) are due to the poor growth response with the 2021 poor growing conditions. Warm-season plants are well-adapted to heat, however, they still require water for growth. Soil nutrients require water to be transported from the roots to the leaves and stems. Thus, insufficient water limits nutrient uptake from the root zone. Higher concentrations of nutrients often accumulate in water-stressed leaves and stems, because dry matter increases with less water in plant cells. Overall, the protein and energy values of all ten species meet the needs of lactating beef cows and growing young cattle as feeders or weaned calves.

# REGIONAL SILAGE OATS-2021

| Regional Silage Oats 2021 | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Variety tested in 2021 Trials (yield and Nutritional data only comparable to CDC Baler)* | | | | | | | |
| Varieties | **Yield** | **Feed Nutritional %** | | | | | |
| | **t/ac** | **CP** | **TDN** | **Ca** | **P** | **K** | **Mg** |
| CDC Baler | **100.0** | **100** | **100** | **100** | **100** | **100** | **100** |
| AC Morgan | 110 | 110.9 | 102 | 88 | 128 | 95 | 116 |
| AC Juniper | 85 | 111.4 | 102 | 82 | 116 | 93 | 105 |
| CDC Arborg | 103 | 111.6 | 102 | 78 | 124 | 89 | 116 |
| CDC Haymaker | 95 | 109.7 | 102 | 90 | 112 | 95 | 100 |
| CDC Nasser | 113 | 105.4 | 101 | 84 | 116 | 98 | 105 |
| CS Camden | 116 | 113.7 | 116 | 90 | 108 | 91 | 105 |
| Murphy | 147 | 105.9 | 101 | 90 | 120 | 93 | 116 |
| Ore 3542 M | 57 | 119.9 | 107 | 96 | 120 | 90 | 105 |
| CDC SO-1 | 72 | 108.2 | 102 | 86 | 100 | 95 | 105 |

The above protein and energy nutrient values would satisfy the requirements of a dry, pregnant beef cow in mid-pregnancy. The minimum protein requirements for a cow in her second trimester of pregnancy is 7% crude protein, and a cow in late pregnancy (third trimester) has a minimum protein requirement of 9% crude protein. The energy values of these below-average values note the potential need for extra supplementation, especially for thinner cows coming from drought-stricken pastures. Both protein and energy values are below average for oat silage. According to nutritional tables from CowBytes and Nutrient Requirements of Beef Cattle, oat silage is typically at 58 to 60.4% TDN and 10.6 to 12.7% CP. The Ca:P ratios are at 1:1 which is typical for cereal silages. The lower quality in each of the varieties is due to the poor growing conditions of 2021. A combination of heat stress and drought during the summer would have caused plants to prioritize water conservation above and below ground, which impacts nutrient uptake, yield, and nutrient quality of the plants.

# REGIONAL SILAGE TRITICALE-2021

| Regional Silage Triticale 2021 | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Variety tested in 2021 Trials (yield and Nutritional data only comparable to Taza)* | | | | | | | |
| | **Yield** | **Feed Nutritional %** | | | | | |
| Varieties | **t/ac** | **CP** | **TDN** | **Ca** | **P** | **K** | **Mg** |
| Taza | **100.0** | **100** | **100** | **100** | **100** | **100** | **100** |
| AAC Awesome | 91 | 118.5 | 105 | 116 | 131 | 107 | 111 |
| AAC Delight | 67 | 88.2 | 101 | 91 | 134 | 116 | 100 |
| AAC Paramount | 83 | 88.3 | 101 | 100 | 114 | 104 | 89 |
| AC Andrew | 66 | 112.0 | 110 | 81 | 141 | 112 | 105 |
| AC Sadash | 88 | 100.7 | 107 | 188 | 134 | 120 | 121 |
| KWS Alderon | 76 | 95.2 | 104 | 97 | 107 | 99 | 95 |
| Bunker | 90 | 92.5 | 102 | 113 | 117 | 105 | 121 |
| Sunray | 78 | 95.2 | 104 | 91 | 138 | 105 | 100 |
| AB Stampeder | 84 | 100.5 | 107 | 106 | 124 | 125 | 126 |

The results of each of the treatment varieties tested are ideal for beef cows that are dry, pregnant, and at their mid to late trimester of pregnancy. The minimum protein requirements for a cow in her second trimester of pregnancy is 7% crude protein, and a cow in late pregnancy (third trimester) has a minimum protein requirement of 9% crude protein. The energy values of these values note the potential need for extra energy supplementation, especially for thinner cows coming from drought-stricken pastures. Protein and energy values are below average; according to CowBytes and Nutritional Requirements for Beef Cattle, average crude protein for triticale silage is between 10.3 and 13.1%.

Average TDN should be between 57.8 and 59%. The Ca:P ratios are typical of a cereal silage; cattle require a Ca:P ratio of 2:1 or better. Therefore, supplementing with a high-calcium mineral mix is recommended when feeding cereal silages, if no legume hays are also supplied. The lower quality in each of the varieties is due to the poor growing conditions of 2021. A combination of heat stress and drought during the summer would have caused plants to prioritize water conservation above and below ground, which impacts nutrient uptake, yield, and nutrient quality of the plants.

# REGIONAL SILAGE BARLEY-2021

| Regional Silage Barley 2021 | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Variety tested in 2021 Trials (yield and Nutritional data only comparable to CDC Austenson)* | | | | | | | |
| Varieties | Yield | Feed Nutritional % | | | | | |
| | t/ac | CP | TDN | Ca | P | K | Mg |
| CDC Austenson | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| AB Advantage | 53 | 86 | 97 | 120 | 111 | 102 | 106 |
| AB Cattlelac | 80 | 84 | 95 | 133 | 95 | 108 | 106 |
| AB Wrangler | 79 | 85 | 95 | 102 | 84 | 101 | 100 |
| Altorado | 65 | 81 | 95 | 135 | 84 | 118 | 147 |
| Amisk | 49 | 79 | 96 | 122 | 95 | 92 | 124 |
| Canmore | 84 | 91 | 98 | 98 | 84 | 112 | 82 |
| CDC Bow | 100 | 94 | 99 | 141 | 74 | 114 | 94 |
| CDC Cowboy | 85 | 99 | 100 | 111 | 95 | 96 | 112 |
| CDC Maverick | 66 | 90 | 118 | 91 | 100 | 102 | 88 |
| Claymore | 67 | 88 | 98 | 133 | 63 | 121 | 118 |
| Sundre | 68 | 86 | 97 | 120 | 74 | 102 | 100 |
| AB Hauge | 67 | 103 | 102 | 109 | 100 | 107 | 88 |
| AB Tofield | 63 | 93 | 100 | 126 | 100 | 112 | 112 |

The resulting nutrient data for barley silage shows that it's no better in quality than barley straw. Protein values are well below any nutrient requirements of livestock and would require additional protein and energy supplementation. According to Cow Bytes, barley silage nutrient values should average from 11.1 to 12.1% CP and from 60.6 to 62.56% TDN. The poor nutrient values are not due to harvesting the barley at late maturity. Rather, it is due to the water-stress and heat-stress barley plants received over the summer months. A combination of heat stress and drought during the summer would have caused plants to prioritize water conservation above and below ground, which impacts nutrient uptake, yield, and nutrient quality of the plants.

# SPRING-FALL CEREAL MIXTURE-2021

| Regional Silage Spring-Fall Mix 2021 | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Variety tested in 2021 Trials (yield and Nutritional data only comparable to CDC Austenson)* | | | | | | | |
| Varieties | Yield | Feed Nutritional % | | | | | |
| | t/ac | CP | TDN | Ca | P | K | Mg |
| CDC Austenson | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Taza | 83 | 105 | 101 | 89 | 132 | 93 | 90 |
| CDC Baler | 66 | 91 | 97 | 79 | 96 | 78 | 87 |
| Bobcat/Taza | 74 | 99 | 99 | 99 | 96 | 87 | 87 |
| Bobcat/CDC Baler | 94 | 101 | 100 | 83 | 108 | 91 | 93 |
| Bobcat/CDC Austenson | 83 | 97 | 97 | 101 | 96 | 92 | 87 |
| AAC Wildfire/Taza | 85 | 112 | 103 | 82 | 112 | 98 | 90 |
| AAC Wildfire/CDC Baler | 111 | 113 | 103 | 87 | 128 | 98 | 90 |
| AAC Wildfire/CDC Austenson | 56 | 90 | 96 | 80 | 100 | 86 | 83 |
| Prima/Taza | 110 | 93 | 98 | 92 | 88 | 94 | 93 |
| Prima/CDC Baler | 103 | 102 | 101 | 90 | 116 | 90 | 93 |
| Prima/CDC Austenson | 94 | 96 | 99 | 94 | 100 | 90 | 90 |

Most treatments would meet the minimum requirements for a dry pregnant beef cow in mid-pregnancy. However, others, such as Prima/Taza mix, the AAC Wildfire/CDC Austenson mix, Bobcat/Taza mix, and CDC Baler control, will require extra supplementation in terms of protein and energy to meet maintenance requirements. The protein and energy values (particularly CP and TDN) are lower than what is normally seen in cereal silages. According to Cow Bytes and Nutrient Requirements of Beef Cattle, cereal silages typically range from 10 to 13% CP and 60 to 62% TDN. Typically, most cereal hays (greenfeed) or silages have inadequate Ca: P ratios, requiring extra calcium supplementation in livestock rations. It is likely a combination of factors including stressful conditions with the 2021 growing season and late harvest played a role on the resulting nutritional values obtained from this trial.

# PULSE-CEREAL MIXTURE-2021

| Regional Pulse-Cereal Silage Mix 2021 | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Variety tested in 2021 Trials (yield and Nutritional data only comparable to CDC Austenson)* | | | | | | | |
| Varieties | Yield | Feed Nutritional % | | | | | |
| | t/ac | CP | TDN | Ca | P | K | Mg |
| CDC Austenson | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| CDC Baler | 106 | 97 | 101 | 90 | 103 | 105 | 94 |
| Taza | 103 | 90 | 97 | 56 | 83 | 92 | 61 |
| CDC Austenson/CDC Meadow | 80 | 102 | 97 | 93 | 94 | 103 | 90 |
| CDC Baler/CDC Meadow | 114 | 83 | 98 | 66 | 77 | 105 | 71 |
| Taza/CDC Meadow | 101 | 82 | 96 | 66 | 83 | 121 | 81 |
| CDC Austenson/CDC Jasper | 76 | 98 | 99 | 63 | 100 | 86 | 71 |
| CDC Baler/CDC Jasper | 112 | 92 | 100 | 70 | 80 | 112 | 77 |
| Taza/CDC Jasper | 103 | 104 | 96 | 101 | 74 | 91 | 84 |
| CDC Austenson/Snowbird | 94 | 99 | 98 | 112 | 86 | 104 | 100 |
| CDC Baler/Snowbird | 96 | 95 | 98 | 116 | 80 | 108 | 100 |
| Taza/Snowbird | 114 | 91 | 94 | 56 | 97 | 95 | 68 |

The mixes here would satisfy the nutrient requirements for late-pregnant dry cows that are maintaining body condition. There is limited data on the average protein and energy content for pea-cereal mix silage, however by comparison according to Cow Bytes, straight pea silage is 12.3% CP and 65.7% TDN, and cereal silages (barley, triticale, oats) are typically around 11% CP and 61.5% TDN. With this year's trial, the lower protein values coincide with the lower TDN values, due to the inclement growing conditions of 2021. The Ca: P ratios are satisfactory in that no extra calcium supplementation is necessary.

# EVALUATION OF PERENNIAL FORAGE MIXTURE FOR HAY OR PASTURE

## Executive summary

**This project aims to provide current knowledge about perennial forage mixtures for hay and pasture production in Alberta. The year 2020 was the establishment year for perennial forages. Eleven types of grass,17 Legumes, and 11 mixes (Table 1) were seeded in three different trials on July 13, 2020, due to late seed supply.**

**Table 1. List of Perennial Species used in Trials**

| # | Grasses | Legumes | Mixes |
|---|---|---|---|
| 1 | Fleet Meadow Brome | AC Grazeland Alfalfa | Fleet Meadow Brome/AC Yellowhead Alfalfa |
| 2 | AC Admiral Meadow Brome | Dalton Alfalfa | AC Success Hybrid Brome/AC Yellowhead Alfalfa |
| 3 | Cache Meadow Brome | Halo Alfalfa | Fleet Meadow Brome/Spredor 5 Alfalfa |
| 4 | AC Success Hybrid Brome | Rambler Alfalfa | AC Success Hybrid Brome/Spredor 5 Alfalfa |
| 5 | Greenleaf Pubescent Wheatgrass | Rangelander Alfalfa | Fleet Meadow Brome/AC Yellowhead Alfalfa/AC Mountainview Sainfoin |
| 6 | AC Saltlander Green Wheatgrass | Rugged Alfalfa | AC Success Hybrid Brome/AC Yellowhead Alfalfa/AC Mountainview Sainfoin |
| 7 | Killarney Orchardgrass | Spredor 4 Alfalfa | Fleet Meadow Brome/AC yellow head/AC mountain/Veldt Cicer Milk Vetch |
| 8 | Blizzard Orchardgrass | Spredor 5 Alfalfa | AC Success Hybrid Brome/AC Yellowhead Alfalfa/AC Mountainview Sainfoin/Veldt Cicer Milkvetch |
| 9 | Courtney Tall Fescue | AC Yellowhead Alfalfa | Fleet Meadow Brome/AC yellow head/Greenleaf |
| 10 | Grindstad Timothy | PV Ultima Alfalfa | AC Success Hybrid Brome/AC yellow head/Greenleaf |
| 11 | Randit Italian Ryegrass | Spyder Alfalfa | Salinemaster (AC Saltlander Green Wheatgrass, Barolex Tall Fescue, AC Rocket Smooth Brome, Revenue Slender Wheatgrass) |
| 12 | | Assalt Alfalfa | |
| 13 | | Phabalous Alfalfa | |
| 14 | | 20-10 Alfalfa | |
| 15 | | AC Mountainview Sainfoin | |
| 16 | | AAC Glenview Sainfoin | |
| 17 | | Veldt Cicer Milkvetch | |

Each of the three experiments were laid out in RCBD (randomized complete block design), assigned in four replications. Glyphosate was used for pre-seed burn-off, and all three trials were seeded on wheat stubble. Standard fertilizer rates were applied according to the research site's soil test report (N:P:K:S = 54:15:10:10). Due to late seeding in mid-July, germination was later than optimal. As a result, the plots experienced poor growth during their first year of establishment. Growing conditions of 2020 in central Alberta also impacted establishment and growth; it was noticeably cooler and wetter than 2021 (see Table 2). The lower rainfall and high temperatures of 2021 were quite challenging for producers, as well as our research trials.

**Table 2. Average Precipitation (mm) 2019-2021**

| | Year | | Normals |
|---|---|---|---|
| | 2020 | 2021 | |
| **Precipitation** (mm) | 345.8 | 213.7 | 323.5 |
| **Temperature** (°C) | 26 | 30 | |

In 2021, plants began to grow at the end of April. Plant growth was relatively unstable due to dry conditions until June 2021. Plant counts were done to determine plant emergence in the first week of June (June 8, 2021). Plant heights were measured, and the stage of maturity was assessed prior to harvesting. The first cut of perennial grasses, legumes, and mixes was made on the 22nd, 23rd, and 27th of July. Dry matter yield was recorded for each variety or plant type, and subsamples were sent away to compare the nutritional value of each different variety seeded in our plots.

The following tables show the nutritional results for each variety and species we established. There is no data for Randit Italian Ryegrass due to its substantially poor germination, emergence, and growth. Very few plants were counted in the spring of 2021, and there was insufficient biomass to collect to have a nutritional analysis done. It is likely that most of the plants that germinated in July or August 2020 were killed prior to and during the winter.

| Perennial Forage Trial Grasses 2021 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Varieties | Yield | | Feed Nutrition % | | | | | |
| | tons/acre | kg/ha | CP | TDN | Ca | P | K | Mg |
| Fleet | 2.32 | 5192.8 | 7.693 | 61.27 | 0.285 | 0.108 | 1.418 | 0.13 |
| AC Admiral | 2.21 | 4951.3 | 10.473 | 63.06 | 0.308 | 0.13 | 1.778 | 0.148 |
| Cache | 2.29 | 5126.5 | 8.153 | 60.75 | 0.33 | 0.123 | 1.61 | 0.153 |
| AC Success | 2.01 | 4504.5 | 9.82 | 62.55 | 0.31 | 0.138 | 1.425 | 0.15 |
| Greenleaf | 2.74 | 6144.3 | 10.715 | 60.27 | 0.273 | 0.173 | 1.075 | 0.115 |
| AC Saltlander | 1.41 | 3159 | 12.518 | 62.91 | 0.425 | 0.145 | 1.938 | 0.158 |
| Killarney | 2.10 | 4716 | 11.443 | 62.21 | 0.308 | 0.158 | 2.368 | 0.205 |
| Blizzard | 2.05 | 4605 | 9.01 | 63.36 | 0.28 | 0.133 | 2.46 | 0.178 |
| Courtney | 2.52 | 5639.3 | 7.918 | 61.03 | 0.325 | 0.1 | 2.235 | 0.215 |
| Grindstad | 2.69 | 6040.8 | 9.398 | 64.83 | 0.195 | 0.15 | 0.965 | 0.115 |

| Perennial Forage Trial Legumes 2021 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Varieties | Yield | | Feed Nutrition % | | | | | |
| | tons/acre | kg/ha | CP | TDN | Ca | P | K | Mg |
| AC Grazeland | 3.66 | 8199.286 | 15.915 | 57.96 | 1.123 | 0.158 | 1.813 | 0.223 |
| Dalton | 3.56 | 7974.288 | 19.295 | 59.84 | 1.24 | 0.198 | 1.855 | 0.258 |
| Halo | 3.63 | 8133.573 | 16.575 | 59.56 | 1.13 | 0.203 | 1.755 | 0.225 |
| Rambler | 3.70 | 8292.861 | 18.78 | 58.72 | 1.26 | 0.188 | 1.848 | 0.24 |
| Rangelander | 3.80 | 8512.146 | 14.963 | 57.33 | 1.07 | 0.158 | 1.8 | 0.193 |
| Rugged | 2.91 | 6517.143 | 18.683 | 59.93 | 1.24 | 0.185 | 1.86 | 0.238 |
| Spredor 4 | 3.57 | 7996.431 | 16.328 | 61.51 | 1.325 | 0.223 | 1.918 | 0.24 |
| Spredor 5 | 3.04 | 6818.573 | 18.268 | 60.15 | 1.243 | 0.185 | 1.868 | 0.235 |
| AC Yellowhead | 3.39 | 7609.286 | 16.393 | 57.37 | 1.01 | 0.17 | 1.765 | 0.228 |
| PV Ultima | 4.02 | 9018.571 | 15.888 | 57.51 | 1.188 | 0.143 | 1.61 | 0.218 |
| Spyder | 3.49 | 7830.001 | 17.79 | 59.59 | 1.19 | 0.168 | 1.703 | 0.205 |
| Assalt | 3.85 | 8640.003 | 16.453 | 57.81 | 1.083 | 0.175 | 1.68 | 0.185 |
| Phabalous | 2.95 | 6620.713 | 17.573 | 59.23 | 1.363 | 0.178 | 1.855 | 0.245 |
| 20-10 | 3.61 | 8083.571 | 20.155 | 60.93 | 1.268 | 0.205 | 1.923 | 0.24 |
| AC Mountainview | 2.08 | 4672.86 | 10.808 | 60.67 | 1.045 | 0.123 | 1.215 | 0.263 |
| AAC Glenview | 1.74 | 3910.715 | 14.063 | 59.18 | 1.148 | 0.173 | 1.285 | 0.273 |
| Veldt | 1.57 | 3514.285 | 14.36 | 61.62 | 1.053 | 0.203 | 2.47 | 0.35 |

Despite the consistency of TDN (total digestible nutrients) values of all the above varieties, crude protein (CP) contents of all varieties are less so. All plots were harvested at the same time therefore all varieties were relatively at the same stage[s] when cut. All grasses were cut when they were at or past the flowering stage. The environmental growing conditions more than likely have the most significant influence on nutritional values, due to the hot and dry conditions as mentioned in the executive summary. Certain varieties tend to perform better under adverse conditions such as heat and lack of moisture than others, such as AC Saltlander. From our data, and only based on crude protein values, the varieties that are suitable for a dry, pregnant beef cow in mid-trimester are Fleet Meadow Brome, Cache Meadow Brome, and Courtney Tall Fescue. A beef cow in the late-trimester or close to calving would do well with AC Success Hybrid Brome and Blizzard Orchardgrass. Post-calving lactating beef cows would have their needs met with AC Admiral Meadow Brome, Greenleaf Pubescent Wheatgrass, AC Saltlander Green Wheatgrass, and Killarney Orchardgrass. The TDN values are normal for perennial grasses harvested at the aforementioned stages, as are all macromineral levels. Pure grass hay averages at around 10 to 12% crude protein and 62% TDN, according to CowBytes ration formulation program and Nutritional Requirements of Beef Cattle.

All legumes from 2021 have nutritional values that are at or slightly above average for pure legume stands, more specifically for legume hays. Since there are many more varieties of alfalfa than either sainfoin or cicer milkvetch, the greater focus will be with alfalfa in observing notable variations in nutritional quality. However, such variabilities are insignificant, as they all provide sufficient protein for most classes of livestock, particularly lactating cows (beef and dairy) and growing young cattle. The TDN values are at or slightly above average for most legume hays, with average being approximately 57 to 61% TDN according to CowBytes ration formulation software and Nutrient Requirements for Beef Cattle. Typically, the earlier in bloom or more vegetative a legume stand is, the higher the energy and protein content will be, as opposed to late- or full-bloom stands. Legume hays are typically lower in energy than what growing or lactating animals need, therefore supplementation with an energy-dense feed such as grain would be necessary to meet all requirements.

| Perennial Forage Trial Mixes 2021 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Varieties | Yield(tons/acre) | | Feed Nutrition % | | | | | |
| | Grasses | Legumes | CP | TDN | Ca | P | K | Mg |
| Fleet Meadow Brome/AC Yellowhead | 1.53 | 0.79 | 10.68 | 61.44 | 0.783 | 0.13 | 1.705 | 0.17 |
| AC Success Hybrid Brome/AC Yellowhead | 1.96 | 0.55 | 10.80 | 61.51 | 0.738 | 0.13 | 1.545 | 0.168 |
| Fleet Meadow Brome/Spredor 5 | 1.47 | 0.69 | 10.24 | 59.79 | 0.843 | 0.11 | 1.613 | 0.173 |
| AC Success Hybrid Brome/Spredor 5 | 1.28 | 0.79 | 13.24 | 60.56 | 1.018 | 0.145 | 1.615 | 0.203 |
| Fleet Meadow Brome/AC Yellowhead/AC Mountainview | 1.44 | 0.87 | 12.18 | 60.34 | 1.263 | 0.138 | 1.493 | 0.275 |
| AC Success Hybrid Brome/AC Yellowhead/AC Mountainview | 1.04 | 1.19 | 12.85 | 59.78 | 0.925 | 0.148 | 1.588 | 0.208 |
| Fleet Meadow Brome/AC Yellowhead/AC Mountainview/Veldt Cicer Milkvetch | 1.53 | 0.55 | 13.10 | 61.48 | 1.055 | 0.145 | 1.68 | 0.28 |
| AC Success Hybrid Brome/AC Yellowhead/AC Mountainview/Veldt Cicer Milkvetch | 1.03 | 1.179 | 13.28 | 62.24 | 0.838 | 0.165 | 1.59 | 0.245 |
| Fleet Meadow Brome/AC Yellowhead/Greenleaf | 2.00 | 0.30 | 9.46 | 59.73 | 0.748 | 0.118 | 1.728 | 0.19 |
| AC Success Hybrid Brome/AC Yellowhead/Greenleaf | 0.67 | 1.28 | 11.8 | 60.66 | 0.753 | 0.135 | 1.675 | 0.195 |
| Salinemaster | 1.11 | | 7.79 | 61.84 | 0.29 | 0.12 | 1.455 | 0.118 |

Each of these mixes contain a combination of grass and legume species and cultivars. These are generally expected to show some differences in nutritional analyses, especially in terms of protein, energy, and macrominerals as shown in the table above. On average, most legume-grass (or grass-legume) mix hays will have protein values that range from 11 to 13% crude protein, and energy values of 58 to 60% TDN. All, except one, mixture is at or slightly above these averages. The only mixture that is slightly below average is AC Success/AC Yellowhead/Greenleaf mixture, but that is only in terms of protein. The TDN value is at the normal level. Overall, all mixes would satisfy the nutrient requirements for a lactating beef cow with calf at side and yearling feeder cattle at or over 900 pounds.

# AGRONOMIC PERFORMANCE OF HYBRID-CORN VARIETIES SEEDED WITH A PRECISION PLANTER AND CLIMATE FIELD VIEW PLATFORM

Feed costs account for 50 to 70 percent of input costs in livestock operations. Producers always look for new silages and grazing options in Alberta. Corn offers livestock producers a dynamic option to reduce their feed costs in different farming operations. Corn can be grazed, which reduces the operation costs of harvest and feeding equipment. It has been successfully used during the summer, fall, and winter months in various parts of Alberta. This project will provide regional performance data on Hybrid-Corn, which will help farmers and ranchers to select the best forage corn varieties for East-Central Alberta.

Sites were established by BRRG, and Hovde Farm located in Camrose and Flagstaff Counties. A common seed source for all trial entries were used by all project collaborators. Corn was seeded with a precision planter Harvest International. Corn was Seeded at five seeding rates per acre on May 07, in Camrose, and silage on Sep 27-2021 respectively.

There are noticeably low protein values at the Camrose site; according to CowBytes and Nutrient Requirements of Beef Cattle, corn silage crude protein values, on average, are around 8 to 10%. Energy values are average, a few varieties with slightly above average TDN values (which is 64.2 to 67.7% TDN), primarily because of the starch values being at around 25% or better. A couple varieties, NS913 and HZ1710 have very low starch content; this could be due to the stage of maturity of the corn plants that were cut. The cobs of these two varieties did not have sufficient time to fill out. Cob immaturity is likely due to the varieties being late maturing, or the site and climate did not allow these varieties to fulfill their potential. Interestingly, these same varieties have higher protein content values. This may be due to the protein still retained in the leaves as well as the cobs.

Macrominerals are average in their ranges, calcium expressing more variability than either phosphorus (P), potassium (K), or magnesium (Mg). This may be attributed to a variety's ability to uptake more nutrients than others. Overall, the varieties are best utilized as corn grazing for dry, mature beef cows in their second trimester of pregnancy.

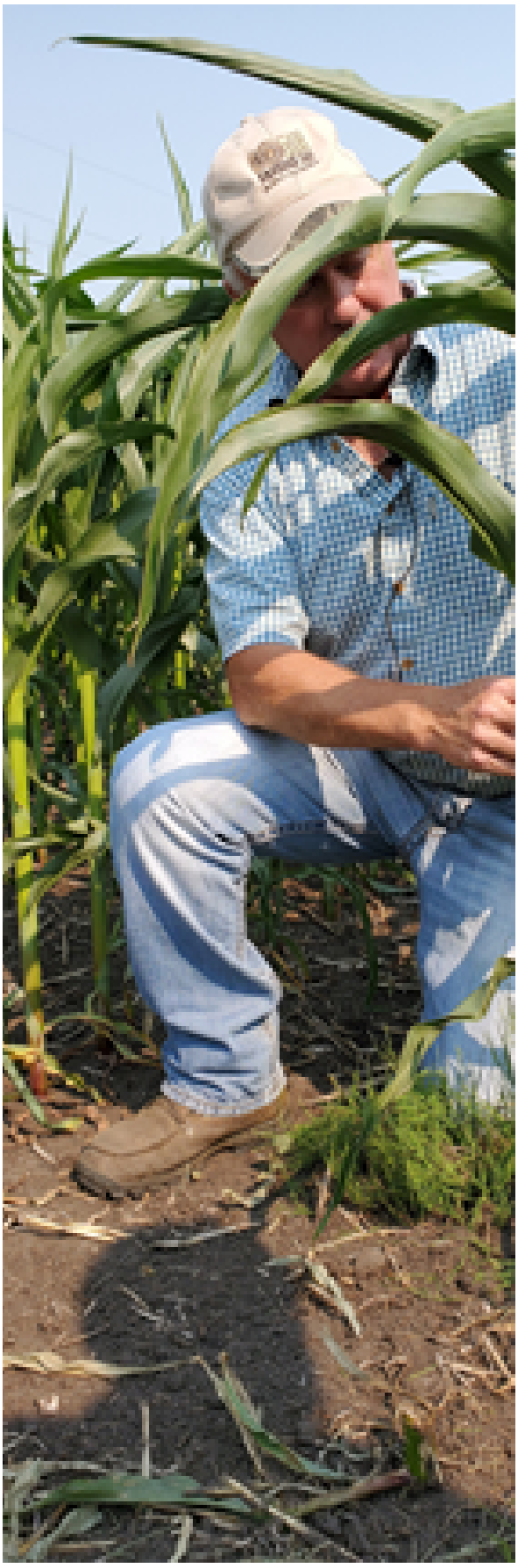
# AGRONOMIC PERFORMANCE OF HYBRID-CORN VARIETIES SEEDED WITH A PRECISION PLANTER AND CLIMATE FIELD VIEW PLATFORM

| | Corn Silage Trial – Camrose | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Varieties | Yield | | | Feed Quality | | | | | |
| | tons/acre | kg/ha | CP | TDN | Starch | Ca | P | K | Mg |
| | | | % | % | % | % | % | % | % |
| TH 4072 | 19.69 | 44129.212 | 7.39 | 70.03 | 24.49 | 0.18 | 0.15 | 0.76 | 0.2 |
| Exp 9096 | 15.54 | 34843.916 | 7.32 | 66.25 | 20.16 | 0.29 | 0.11 | 0.96 | 0.2 |
| MZ 1200 | 16.67 | 37373.776 | 6.47 | 68.16 | 15.79 | 0.31 | 0.1 | 0.87 | 0.24 |
| HZ 1267 | 16.42 | 36816.294 | 8.1 | 68.25 | 23.14 | 0.18 | 0.1 | 0.92 | 0.2 |
| HZ 1398 | 17.83 | 39968.009 | 7.04 | 63.60 | 12.46 | 0.26 | 0.11 | 0.93 | 0.22 |
| HZ 1451 | 15.05 | 33733.946 | 8.58 | 65.84 | 17.23 | 0.18 | 0.1 | 0.98 | 0.18 |
| TH 7673 | 14.63 | 32797.948 | 7.11 | 67.38 | 17.26 | 0.17 | 0.1 | 0.86 | 0.24 |
| TH 40722 | 16.89 | 37865.471 | 8.2 | 72.12 | 26.41 | 0.15 | 0.12 | 0.66 | 0.2 |
| TH 6875 | 17.05 | 38219.294 | 6.3 | 62.44 | 15.00 | 0.16 | 0.11 | 0.82 | 0.18 |
| TH 4076 | 14.158 | 31716.151 | 7.28 | 69.30 | 22.19 | 0.12 | 0.11 | 0.6 | 0.18 |
| NS 913 | 14.26 | 31967.856 | 7.62 | 64.01 | 7.79 | 0.34 | 0.08 | 0.74 | 0.23 |
| MZ 728 | 14.93 | 33476.038 | 7.56 | 67.53 | 16.99 | 0.29 | 0.1 | 0.87 | 0.25 |
| HZ 1710 | 13.37 | 29982.498 | 7.91 | 62.40 | 8.25 | 0.38 | 0.12 | 0.95 | 0.27 |
| HZ 8022 | 16.86 | 37789.449 | 7.22 | 66.25 | 14.49 | 0.25 | 0.11 | 0.84 | 0.25 |
| TH 6180 | 16.02 | 35901.301 | 9.18 | 71.87 | 25.74 | 0.23 | 0.13 | 0.65 | 0.21 |
| TH 4126 | 15.55 | 34853.441 | 6.89 | 65.28 | 17.87 | 0.28 | 0.08 | 0.8 | 0.25 |

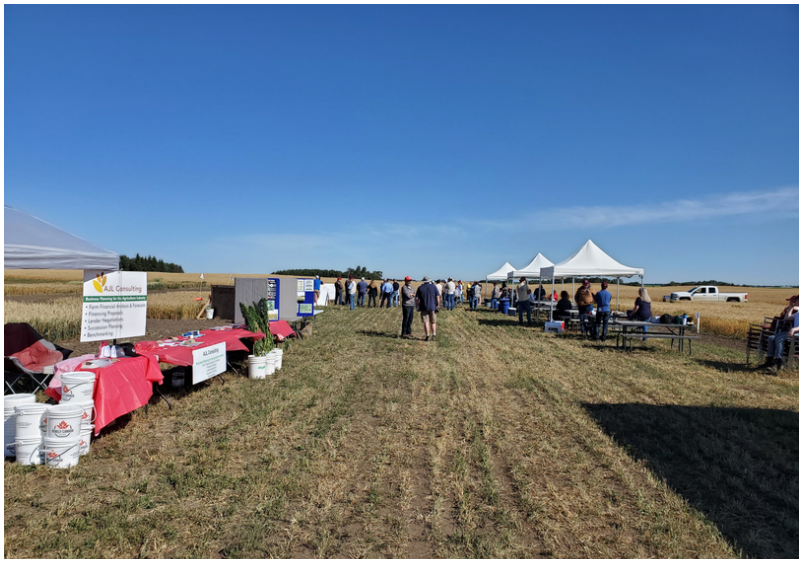
| | Killam Corn Silage | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Yield | Feed Quality | | | | | | |
| | | CP | TDN | Starch | Ca | P | K | Mg |
| | tons/ac | % | % | % | % | % | % | % |
| EXP 9096 | 16 | 8.37 | 63.89 | 24.63 | 0.28 | 0.11 | 1.03 | 0.2 |
| TH 4072 | 16 | 7.26 | 62.7 | 17.31 | 0.26 | 0.09 | 0.95 | 0.2 |
| MZ 1200 | 11 | 8.37 | 64.52 | 20.54 | 0.22 | 0.13 | 0.99 | 0.21 |
| HZ 1267 | 13 | 7.97 | 64.11 | 19.49 | 0.25 | 0.13 | 1.19 | 0.2 |
| HZ 1482 | 12 | 10.49 | 62.41 | 11.77 | 0.28 | 0.14 | 1.31 | 0.17 |
| HZ 1451 | 12 | 7.91 | 61.22 | 11.18 | 0.28 | 0.12 | 1.06 | 0.18 |
| TH 6875 | 13 | 8.23 | 64.45 | 15.92 | 0.25 | 0.13 | 1.17 | 0.21 |
| TH 7420 | 13 | 9.55 | 59.61 | 8.12 | 0.31 | 0.16 | 1.34 | 0.27 |
| TH 4076 | 14 | 9.22 | 50.02 | 5.44 | 0.22 | 0.15 | 1.33 | 0.18 |
| MZ 728 | 12 | 7.46 | 61.97 | 10.52 | 0.31 | 0.11 | 1.31 | 0.2 |
| MZ 8022 | 12 | 8.13 | 63.28 | 17.7 | 0.19 | 0.13 | 1.06 | 0.18 |
| TH 6180 | 14 | 8.49 | 62.98 | 16.25 | 0.23 | 0.12 | 1.04 | 0.2 |
| TH 4216 | 14 | 9.78 | 60.13 | 8.52 | 0.25 | 0.13 | 1.3 | 0.24 |
| NK 80 | 14 | 8.19 | 64.81 | 11.61 | 0.24 | 0.12 | 1.26 | 0.16 |
| HZ 1710 | 15 | 6.82 | 53.11 | 3.5 | 0.26 | 0.07 | 1.26 | 0.16 |

Overall, the Killam site is faring in somewhat better quality than the Camrose site. Most of the varieties are, at a minimum, suitable for a dry, beef cow that is in mid pregnancy (minimum CP of 7%). A few varieties are better suited for a dry beef cow in late pregnancy (minimum CP of 9%), particularly HZ1482, TH7420, TH4076, and TH4216. Interestingly, the varieties with high CP values have some of the lowest starch content. An exception is HZ1710, which has the lowest CP content (6.82%) in addition to the lowest starch content of all varieties (3.5%). The only reason for the low starch content is because the plants were harvested before the cobs had a chance to fill out.

Immature cobs tend to have low starch content; the seeds have not filled out to generate greater starch content. However, the very low protein content is much harder to explain. It is likely that the growing conditions have played a significant role in the lower protein values than what is average. As with protein, most of the varieties are at or slightly below TDN average values. These basically correspond with the lower starch content, or vice versa, as explained above. The trial will be continued in 2022 at Camrose County. Keep in touch for further results.



# BRRG EXTENSION EVENTS OF 2021




The extension calendar for 2021 was eventful! Starting from mid-March to December, much of the events were held virtually due to provincial health regulations restricting indoor in-person meetings. We held most of the events via Zoom, except our field days during the summer. While it is certainly much easier to set up virtual meetings and do everything by computer, we have noticed people still miss the face-to-face networking that often occurs during in-person events. We hope that next year will be an entirely different story!

Our extension list covered a wide array of topic areas. Everything from pre-calving beef cow nutrition to diagnosing diseases in peas, plus market analyst and introducing the AgriProfit$ program, all these gave us a nice selection for our producers and anyone else who was interested in what we had to offer to choose to attend! One innovative event was two in-person consultation sessions with ruminant nutritionist and founder of Yaremcio Ag Solutions, Barry Yaremcio! You can read more about that interesting session below.

With an average of 30 people attending our events, a total of 600 folks tuned in to our virtual webinars. Our WheatStalk field day, with over 50 people attending and enjoying the warm August weather, was a real hit with everyone.

We have been experimenting quite a bit with recording videos of the in-person events, which holds a great deal of promise. We've learned a lot and will take these lessons to our future events to create the best content we can.

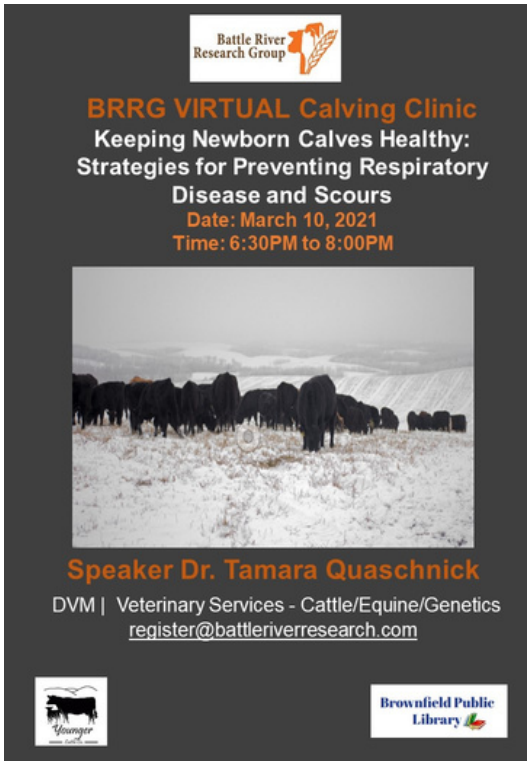
With our new Environmental Extension Agronomist, Karin Lindquist added to the team back in July, we're excited to see what the future holds for BRRG! We have a great many opportunities and potential at our fingertips, so stay tuned for what we've got up our sleeves for 2022!

**March 15th – Annual General Meeting**
There were 28 registered and all attended this meeting. With Khalil as host, general discussions catered around reviews from 2020, and plans and expectations for this year. New board members were voted in, and we had to say goodbye to others who had fulfilled their term.

**March 9th – Viking Auction Mart In-Person Consultancy with Barry Yaremcio & Roger Hovde**


A great way to collaborate with a new business started by two well-known partners and associates of BRRG, plus a great opportunity to dispense knowledge for producers on beef nutrition and corn grazing, the trio of BRRG's own Khalil Ahmed, Barry Yaremcio of Yaremcio Ag Solutions, and Roger Hovde of Corn Ranches made a head-turning debut at the Viking Auction Mart during a live auction event. Several producers stopped by to either just say hello and do a little networking or ask some questions that came to mind for the betterment of their operations. With decades of knowledge combined in one prime opportunity to stop and chat, who couldn't pass up the chance to stop and hear some words of wisdom?

**March 10th – BRRG Virtual Calving Clinic with Dr. Tamara Quaschnick**




With 25 attendees who popped on to have a listen, Dr. Quaschnick provided everyone with a fascinating presentation on calving tips and tricks as well as newborn calf care. Sometimes, the veterinarian cannot always arrive at the farm on time. Knowing what to do and when to do it to save both calf and cow from a sticky situation—or stuck situation—is indeed most helpful. Dr. Quaschnick also shared some handy details on newborn calf health, particularly in terms of timing when the new arrival is in real need of colostrum.

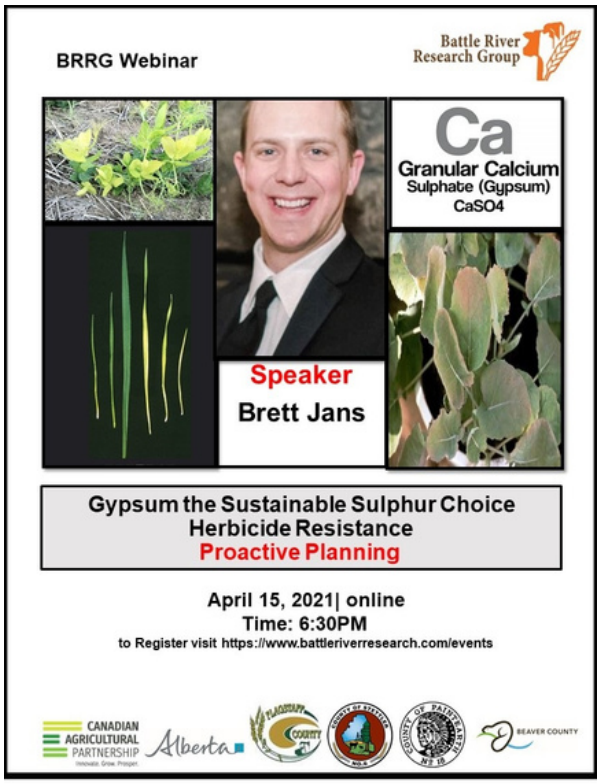
### March 29th – Cattle Marketing Insights & Tools with Brian Perillat

Brian Perillat of CANFAX presented some tips to help producers navigate their way around market analysis for cattle, as well as the current market outlook for the start of 2021. Brian also talked about the influences on the cattle market, such as seasonality and insurance plus import/export markets based on some of Canada's largest competitors. The last half of the webinar discussed an Xcel spreadsheet tool that Brian has used to determine calf prices based on the futures market. We had a good turnout—45 participants logged in to have a listen to Brian's presentation.


### April 13th – Cropland Lease Arrangements with Ted Nibourg

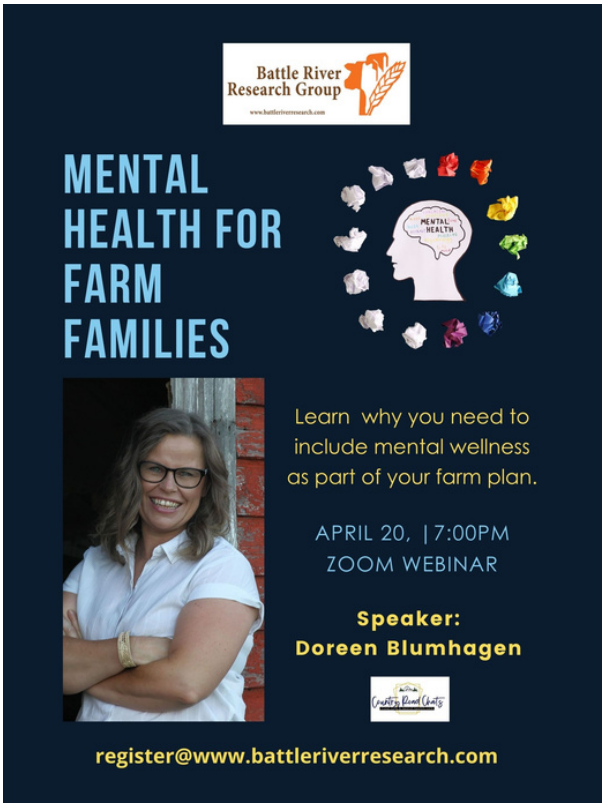
Independent farm management consultant Ted Nibourg talked to 20 folks who joined our webinar to learn about lease arrangements with cropland. It's a timely event since it's getting very close to the start of seeding time here in Alberta. Ted discussed the advantages and disadvantages of leasing cropland, the types of leases that producers need to deal with—with particular emphasis on cash leases versus crop-share lease arrangements—as well as what makes a successful lease agreement, what responsibilities are expected of both landlords and tenants, the legal/tax issues, and how to establish and reach an agreement with a decent rental rate between the two parties.

**April 15th – Gypsum, the Sustainable Sulfur Source with Brett Jans**




This interesting webinar had Brett Jana, farmer and agronomist out of New Norway, talk about using gypsum as a sulphur fertilizer for crops. We had a good turnout—40 people showed up to attend the hour-long event. The talk featured information on the benefits of gypsum as a calcium-sulphate source for use in canola and pulse crops as compared with other calcium-rich fertilizers like dolomite or calcium carbonate. For the last half of his presentation, Jana also discussed the means and methods to battle herbicide resistance in crops. He talked about the herbicide resistance triangle, about the research behind the effectiveness of mixing different herbicide groups on weeds like hemp nettle and wild oats, and some tips on making herbicides as effective as possible to killing target weeds.

**April 20th – Mental Health for Farm Families with Doreen Blumhagen**




Doreen Blumhagen of Country Road Chats and S&L Blumhagen Farms, with AHS Mental Health & Addictions Program Coordinators Chanel Annable, Christina Harvey, and Les Branton joined us for a discussion about mental health on the farm. It was a great interactive webinar where participants were able to do a couple of little exercises to understand better how to handle—and "fix"—the kind of emotional or mental issues that affects both the farm and the farm family. Doreen shared her wonderful heartfelt mental health story of herself and her husband Shannon with the trials they went through during their difficult times. Chanel, Christina, and Les followed up by providing some resources available for people to use should they need any help.

### April 22nd – Basic Principles & Practices of Holistic Management


Holistic Management International practitioner and rancher Kelly Sidoryk gave us a fantastic presentation about the basic principles and practices of Holistic Management. This is a great introduction to those wondering what Holistic Management is and piques the interest of those considering incorporating HM practices into their operations and businesses. The first 45 minutes of the webinar was Kelly's presentation where she talked about shifting paradigm thinking, the main tools of Holistic Management (human creativity, animals, technology, rest, and fire) and the four ecosystem processes in managing the operation. She also discussed the various context-checking questions to ask to make the right decisions in financial, social, and ecological aspects. Kelly had quite several great questions to answer at the end, which extended the webinar to another 45 minutes of fruitful and enlightening conversations.

### July 8th – Disease Assessment in Peas with Dr. Michael Harding


Dr. Michael Harding from the Lacombe AgCanada Research Station came out to do a field-day session with 25 attendees at our cereal plot near Galahad. This full-day event covered all the interesting tips and tricks on how to scout for disease in peas, including what to look for above the ground and when pulling up suspect plants.

**July 15th – Corn Plots Crop Walk with Roger Hovde**

With a tent set up at the edge of our Camrose corn site, and the weather in full cooperation, farmer and Corn Ranches associate Roger Hovde presented on the corn varieties being grown for our corn silage trial project. Roger went over what the project was about with the 15 folks in attendance, then took us out on a tour amongst the corn plants to talk about the production differences and past results of the varieties being studied. Everything about corn, from agronomics to cattle nutrition when grazing them, plus proper staging for silage harvesting, was covered.

**July 21st – BRRG Crop Walk with Kevin Elmy & Karin Lindquist**

Despite the cool, misty morning that also permitted the distant visit of a couple of moose afterwards, about 10 attendees braved the weather to come out to our perennials crop walk with Kevin Elmy of his book Cover Cropping in Western Canada (c. 2020) and BRRG's own Karin Lindquist. There were some fascinating discussions about creating diverse mixes and annual cover crop species to include in cover crop mixes for soil health. Because the in-person event was at our forage plots, we couldn't go without talking about both the alternative forages we were growing, as well as the various perennial species ranging from alfalfa to hybrid bromegrass. It was also a great opportunity for our new Environmental Extension Agronomist Karin Lindquist to introduce herself to the crowd and talk a bit about forages from her past days as a forage-beef specialist with the Ag-Info Centre in Stettler. Pizza and networking were provided afterwards to get more conversations going beyond the main event… and to provide everyone with a warmer, drier place to discuss forages, farming, and soil health.

# Cover Crop Workshop

**August 12th – WheatStalk Summer 2021 Tour Field Day**


What an event! With around 60 folks who attended, our big field day was a real hit! Multiple speakers came out to talk about everything from wheat midges to canola field scouting. The event was organized in such a way that different stations were created so that people didn't have to sit for long in one spot. Benches and chairs were still provided to those who best needed them and were moved with the shift from one speaker station to another. Four stations in total were set up. Tents with picnic tables were set up where folks could enjoy a catered lunch by LRT Café and get out of the sun while visiting and networking. .

**October 21st – Regenerative from the Ground Up with Dr. Kris Nichols & Kim Cornish**


Even though it was a small group of producers that showed up to the event—five in total, not including the two speakers and the three BRRG stooges—the presentation and the discussions afterward were nothing short of fruitful and empowering. The event took place at the Stettler Ag Society pavilion. A recorded presentation about regenerative agriculture and the power of soil health on the farm by Dr. Nichols was made. Lots of questions and discussion afterwards—and into our pizza lunch—was had even before the new Living Labs initiative project was announced. Kris and Kim asked the producers present at the event some thought-provoking questions, and even the three BRRG reps—Karin, Khalil, and Alex—got to chime in now and then with their perspectives.

# Soil Health Workshop with Dr. Kris

## November 3 – Environmental Farm Plan Workshop

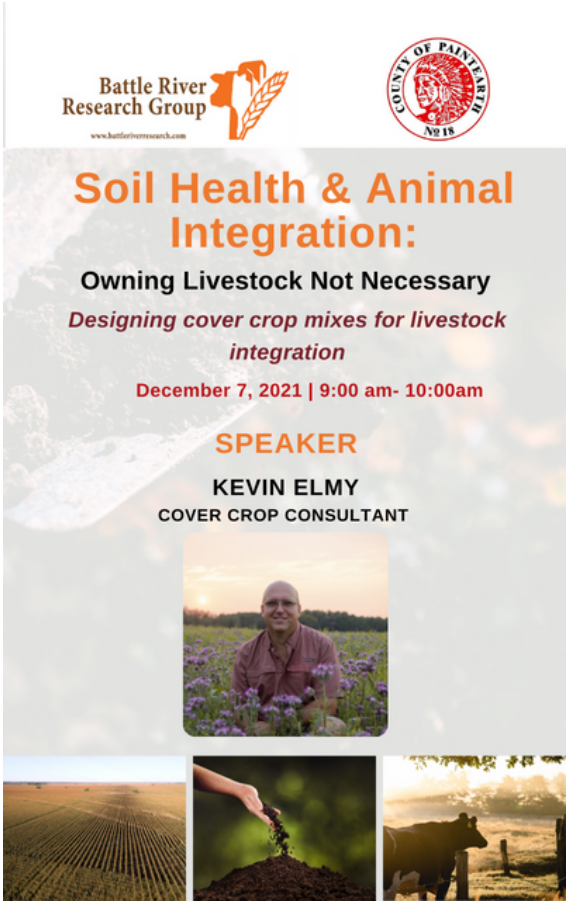
**A workshop for producers was conducted in November with the help of the ARECA group. AS well as BRRG trained an environmental technician to help farmers with farm plans. environmental assessment**


## November 25th – AgriProfits Webinar

About 25 attendees sat in for an introduction to the Government of Alberta's AgriProfit$ Program as an online Zoom webinar. Speakers Ann Boyda, Livestock Economist and M. Manglai, Crops Economist, talked about all the different areas of the farm operation that the program covered. It served as an introduction for those who aren't familiar with the program. Ann started us off with an overview of the program, going over

**December 7th – Soil Health: Livestock Integration with Kevin Elmy**

Kevin Elmy came back for an end-of-the-year banger of a presentation talking all about how to integrate livestock in cover cropping systems on the farm. With about 28 people hopping on to listen, Kevin talked about the importance of developing a grazing plan to meet animals' nutrient requirements, and what species could be added to a mixture for the animals. He was keen to point out how such mixtures can be used for the animals that a producer doesn't own, but they want to grow as part of their crop rotation and to integrate livestock back onto their land. Timing of when to graze was covered, plus understanding what kind of diverse mixture is encouraged for both soil health and for the animals to consume. Following the 45-minute presentation was a great opportunity for the producers on the webinar to ask any questions they had for Kevin.



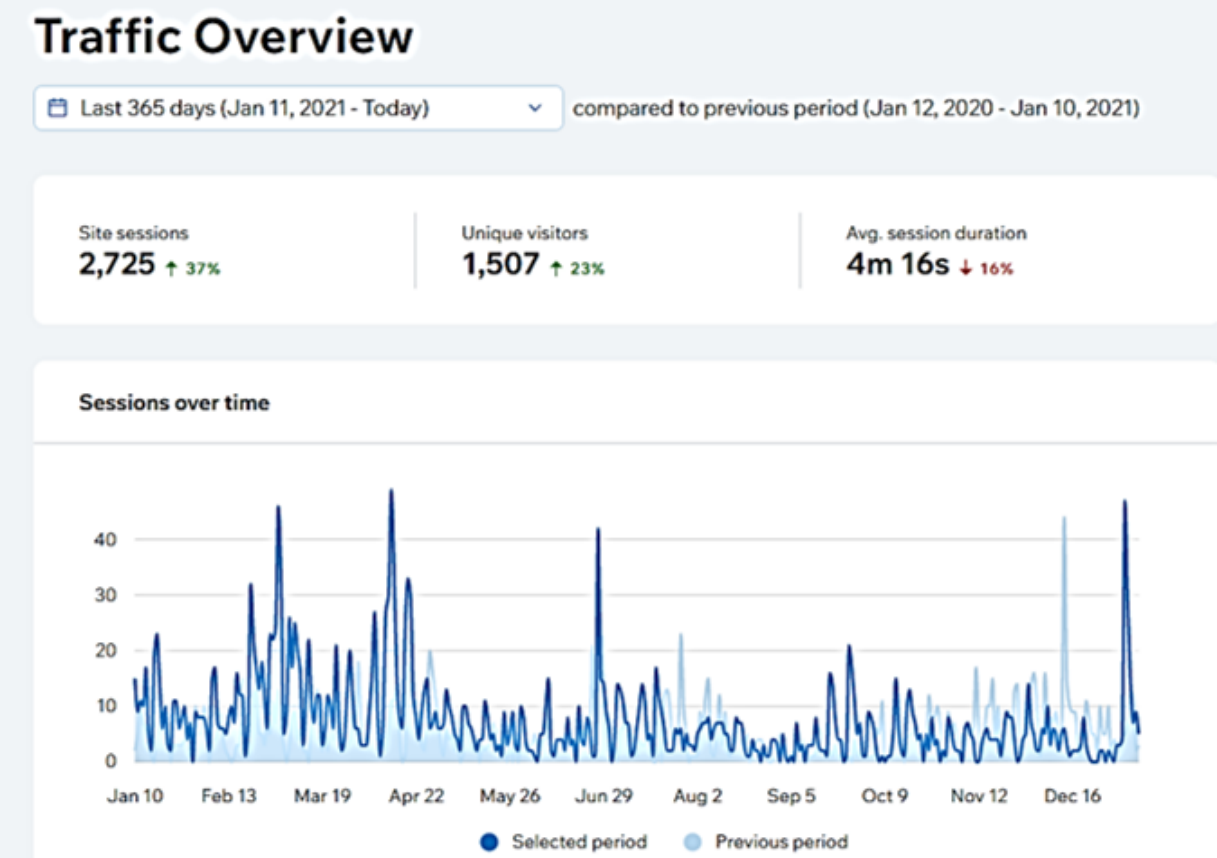
THE YEAR OF TRANSFER OF KNOWLEDGE 2021

# BRRG SOCIAL MEDIA AT A GLANCE

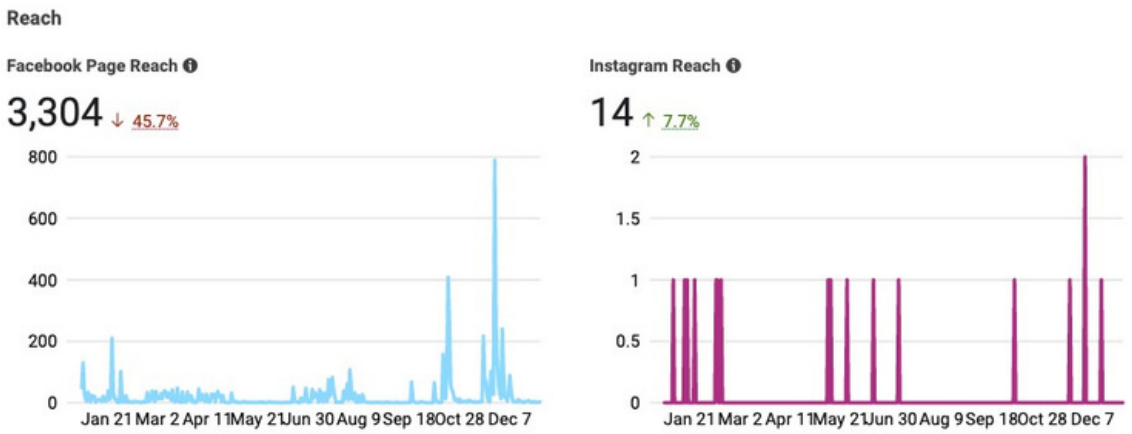
| | | |
|---|---|---|
| **ANNUAL REPORT**<br><br>BRRG publish one yearly report to share the organization's performance and the ongoing research project results with our members and subscriber. The reports are available for the public at our website | **E-NEWSLETTER**<br><br>BRRG published three newsletters/year. All newsletters are available for the public on our website www.battleriverresearch.com | **YOUTUBE**<br><br>BRRG started a YouTube channel in 2020 after COVID hit hard in 2019. We got overall 2K views on our videos. We always shared our informative videos and webinars on YouTube |
| **TWITTER**<br><br>15K FOLLOWERS | **FACEBOOK**<br><br>10K FOLLOWERS | **BLOG ARTICLES**<br><br>BRRG created an online Blog so farmers can comment and share their thoughts we share specialist articles and fact sheets on our blog |

BEAVER COUNTY

# WEBSITE ANALYTICS




# FACEBOOK ANALYTICS



# PEST MONITORING 2021

# INSECT SURVEY RESULTS - 2021 - FLAGSTAFF

**2021 Summary**

The bertha armyworm site in Flagstaff County was well below the first warning level of 300 moths. Continued use of the bertha armyworm traps will give us a warning if the population is building in 2022.

No cabbage seedpod weevil were found in your sweeps. The population in central Alberta seems to have constricted. I have been told that cabbage seedpod weevil, pea leaf weevil and of course wheat midge are not favored by hot, dry weather.

Wheat midge were found in 1 of 6 fields. Even though the survey indicates that the threat of wheat midge is low for 2022, producers and agronomists need to be prepared to monitor fields in 2022 while the wheat is in flower, especially if seeding is late and/or wet conditions prevail.

Pea leaf weevil damage was low in the five fields you surveyed in 2021.

There was not a migration of diamondback moth into Alberta in 2021 during the monitoring period.

**Bertha Armyworm (Baw)**

Bertha armyworm is very cyclical. In order to catch outbreaks and help producers minimize losses it is necessary to maintain a good monitoring system using pheromone traps. The number of moths caught in the traps informs us of the risk of damaging populations with a 3 to 5 week lead time.

| LLD | Trap Average |
|---|---|
| SE-18-41-14-W4 | 68 |

### Cabbage Seedpod Weevil (CSPW)

Cabbage seedpod weevil overwinters as an adult so the risk of infestation is further indicated by the adult population of the preceding fall. Winter condition also appear to have an impact on populations with mild winter favoring build-up of populations and expansion of their range.

We track the population of other insects in these sweeps as well. These go into long term data sets that will help us research their population trends over time from individual fields.

| LLD | CSPW in 25 sweeps | Lygus Adult | Lygus Nymph | Leafhopper | Striped Flea beetle | cruciferer | Other Flea Beetle | Turnip beetle | DBM Adult | DBM larva | Wasp <5 mm | Wasp >5mm | honey bee | bee but not honey | caterpillar |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| nw-32-41-10-W4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| se-34-42-16-W4 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| se-34-45-16-W4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| c-15-45-13-W4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| se-18-41-14-W4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Samples done with standard sweep net. (15" diameter & 3 foot handle). 25-180 degree sweeps.

### Diamondback Moth (DBM)

It is generally accepted that diamondback moth adults don't overwinter in the prairies and that most infestations occur when adult moths arrive on wind currents in the spring from the southern or western United States or northern Mexico. In mild winters there is suspicion that diamondback moth do overwinter in Alberta. To assess the population, a network of 43 monitoring sites has been established across the province. This network is meant to act as part of an early warning system for diamondback moth and should be used in conjunction with crop scouting.

| LLD | Trap Average |
|---|---|
| SE-18-41-14-W4 | 0 |

Alberta Insect Pest Monitoring Network

### Pea Leaf Weevil (PLW)

Experience has shown us that high numbers of pea leaf weevil adults in fall will likely mean significant infestation levels in the following spring. The timing and intensity of spring damage is strongly related to the onset of warm conditions (>20oC) for more than a few days in April or May. The earlier the weevils arrive in fields the higher yield loss potential. Extended cool weather delays weevil movement into the field. Yield impact is lower if the crop advances past the 6 node stage before the weevils arrive. The numbers represented here are generated from assessing feeding damage on 10 plants in 5 locations in a field.

| Legal Land Description | | | | | Average Node Stage | Total Notches | Average notches/Plant |
|---|---|---|---|---|---|---|---|
| se | 6 | 41 | 13 | 4 | 4.08 | 27 | 0.54 |
| ne | 25 | 44 | 15 | 4 | 3.8 | 0 | 0 |
| nw | 13 | 45 | 17 | 4 | 4.06 | 0 | 0 |
| se | 29 | 44 | 12 | 4 | 4.54 | 24 | 0.48 |
| nw | 24 | 41 | 11 | 4 | 4.66 | 12 | 0.24 |

### Wheat midge (WM)

Wheat midge is an insect that increases in numbers in wet years. Numbers can vary drastically from field to field and we try to sample wheat adjacent to the previous years' wheat in order to pick up populations if they are present. There is no definitive way to know exactly the risk in any given field so field scouting when the wheat comes into head is critical. The numbers shown here give a general trend of midge populations. Individual fields will have a different risk.

These numbers are generated by taking soil samples from wheat fields after harvest using a standardized soil probe.

The risk level as shown on our maps is as follows:

- 0 midge will be displayed as light grey (No infestation)
- 2 or less midge will be shown as dark grey (<600/m2)
- 3 to 5 will be shown as yellow (600 to 1200/ m2)
- 6 to 8 will be shown as orange (1200 to 1800/ m2)
- 9 or more will be shown as red. (>1800/ m2)

| Legal Land Description | total Midge | Viable | Parasitoid |
|---|---|---|---|
| sw-30-43-11-W4 | 0 | 0 | 0 |
| se-21-42-10-W4 | 0 | 0 | 0 |
| sw-34-41-14-W4 | 1 | 1 | 0 |
| se-26-44-14-W4 | 0 | 0 | 0 |
| se-8-44-13-W4 | 0 | 0 | 0 |
| sw-22-45-16-W4 | 0 | 0 | 0 |

# INSECT SURVEY RESULTS - 2021 - PAINTEARTH

**2021 Summary**

This insect report is pretty boring, which is a good thing for producers!

Pea leaf weevil damage was low in the survey we conducted in late May – early June. No cabbage seedpod weevil were found in Paintearth.

I didn't find any wheat midge in the soil samples taken by you this fall, but as always it is a good idea for producers and agronomists to keep an eye on the situation in 2022 as the wheat heads out should seeding be delayed or wet conditions prevail.

The bertha armyworm trap site was well below the first warning level of 300 moths l. It will be important to continue with the trapping to understand what is happening in the fields in 2022.

## Bertha Armyworm (Baw)

| LLD | Trap Average |
|---|---|
| SE-15-36-12-W4 | 56 |

## Cabbage Seedpod Weevil (CSPW)

| LLD | CSPW in 25 sweeps | Lygus Adult | Lygus Nymph | Leafhopper | Striped Flea beetle | crucifer | Other Flea Beetle | Turnip beetle | DBM Adult | DBM larva | Wasp <5 mm | Wasp >5mm | honey bee | bee but not honey | caterpillar |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| se-18-39-10-W4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| nw-36-35-11-W4 | 0 | 10 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| se-15-36-12-W4 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| nw-36-37-16-W4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| se-26-39-16-W4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Samples done with standard sweep net. (15" diameter & 3 foot handle). 25-180 degree sweeps.

## Pea Leaf Weevil (PLW)

| Legal Land Description | | | | | Average Node Stage | Total Notches | Average notches/Plant |
|---|---|---|---|---|---|---|---|
| sw | 28 | 39 | 10 | 4 | 5.18 | 11 | 0.22 |
| nw | 34 | 37 | 9 | 4 | 5.4 | 5 | 0.1 |
| nw | 22 | 38 | 12 | 4 | 5.3 | 44 | 0.88 |
| ne | 23 | 37 | 14 | 4 | 5 | 0 | 0 |
| se | 9 | 36 | 12 | 4 | 5.34 | 25 | 0.5 |

## Wheat midge (WM)

| Legal Land Description | total Midge | Viable | Parasitoid |
|---|---|---|---|
| ne-8-39-10-W4 | 0 | 0 | 0 |
| ne-25-36-12-W4 | 0 | 0 | 0 |
| se-4-39-14-W4 | 0 | 0 | 0 |
| se-3-38-16-W4 | 0 | 0 | 0 |
| nw-34-39-16-W4 | 0 | 0 | 0 |

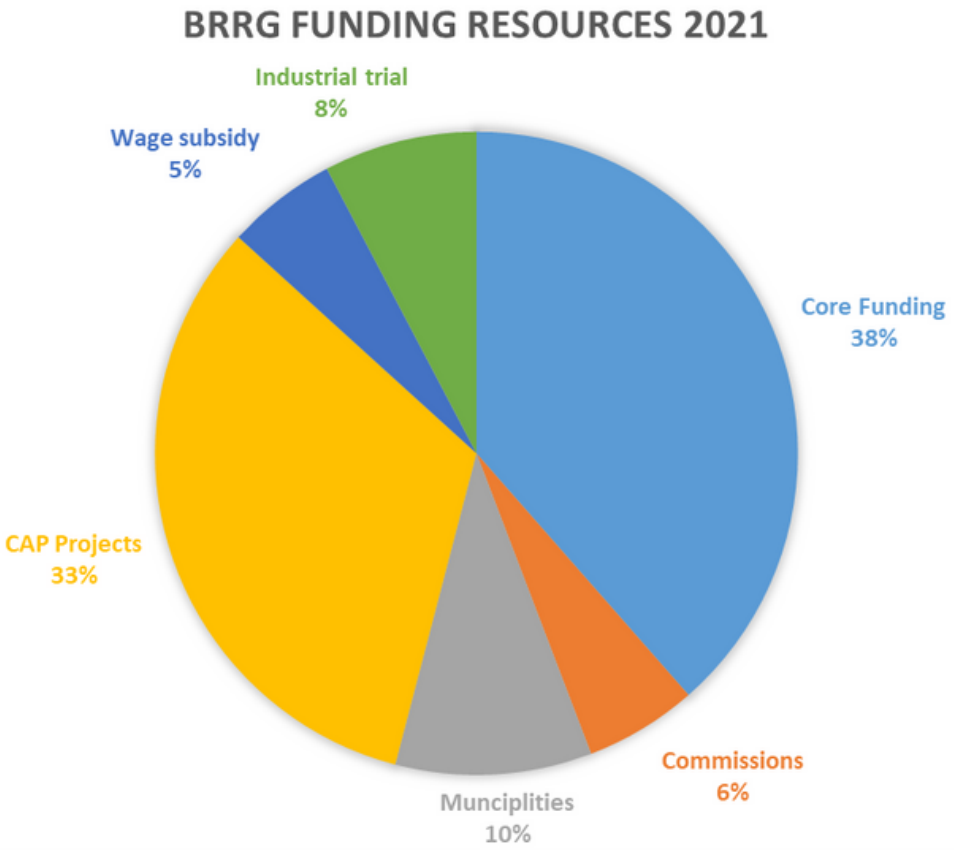
# FIELD SCHOOL TEAM




# SUMMER STAFF 2021

# U of A Student's Training

# FINANCIAL REPORT



# We are Thankful to our Sponsors

- Canadian Agriculture Partnership Program (CAP)
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- Agricultural Research and Extension Council of Alberta (ARECA)
- Farm Rite
- Agriculture and Agri-Food Canada (AAFC)
- Alberta Barley Commission
- Alberta Beef Producers
- Alberta Canola Producers Commission
- Alberta Wheat Commission
- Alberta Pulse Growers
- Canola Council of Canada
- Alberta Pulse Growers


## Thanks to our many other Sponsors and Advisors who helped in 2021

- Shelley Barkley
- Barry Yaremcio
- Union Forages
- Agriculture and Agri-Food Canada
- Seed and Other Support:
- Co-Operators
- Vincent Brothers
- Grazing School for Women Committee
- Battle River Watershed Alliance
- Battle River Community Foundation
- Battle River Implements
- Nutrien Ag Solution Forestburg


## We apologize to anyone we unintentionally omitted

Battle River Research Group

www.battleriverresearch.com


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