WEST-CENTRAL FORAGE ASSOCIATION

2019 ANNUAL REPORT

WEST-CENTRAL FORAGE ASSOCIATION

Vision

Expand our capacity to connect and develop our community through information exchange.

Mission

West-Central Forage Association enhances forage system knowledge to enable the achievement of integrated farm management goals.

West-Central Forage Association

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West-Central Forage Association (WCFA) is a non-profit, producer directed organization providing leading-edge applied, innovative and unbiased research as well as knowledge transfer and learning opportunities to the west-central region. Operating since 1978, we bring together a network of producers, industry and researchers to move the Agricultural industry forward.

We are pleased to make available this edition of our Annual Report. It contains a description and summary of project results and extension activities carried out by WCFA in 2019.

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President's Message

A little about me: I have a purebred registered cattle operation raising Red & Black Angus, Simmental and Hereford cattle. My wife Tanya and our children are active in helping with the success of the operation. I am very pleased to have three generations farming and raising cattle together, and some of the fourth generation are showing great interest in being "future farmers".

I came into the office wanting to put a poster up for our bull sale a few years ago and haven't looked back. That year I was voted onto the board and I have gone from being a board member, to vice-president, to president. This was to be my last year on the board, however with COVID-19 forcing the cancellation of the annual general meeting for 2020, I will be remaining on for another year.

It was once again a challenging year, to say the least. The incredibly wet weather proved to be a challenge throughout the area for many of our members. It was certainly a trying year with all the rain, but in true producer fashion we were all able to battle through. WCFA also experienced significant challenges with their funding in 2019. The government change-over affected the distribution of the core funding we rely on to operate. We attended numerous consultations in regards to the core funding, Canadian Agricultural Partnership (CAP) streams and farmer-led research. Without knowing if or when we would receive the core funding, and without knowing if funding will be stable it is difficult to plan for the future. We eventually received core funding in early 2020, allowing us to continue operations. Stability of funding still remains a question mark, but we have been working diligently to improve this situation.

At the 2019 AGM, WCFA said goodbye to long-time board member Dale Engstrom. Bruce Churchill stepped away from the board as well. We had two great individuals step up to fill these vacant positions. We welcomed Duane Movald and Aren Skogstad to the Board of Directors in 2019, and they have proven to be great assets.

Late 2019 saw our manager, Melissa Freeman begin her maternity leave. In her absence Rachael Nay is filling in as manager. Rachael has some rather large shoes to fill, but she has done her best.

I want to thank the staff for their commitment to WCFA. It has been a trying year, and they have taken on many challenges. The arrival of COVID-19 sticks out as one of the major ones. It has forced us to change the way we do things, and we are continually navigating through this. Jessica and Rachael took on the major challenge of moving our entire facility from Entwistle, to our new locations in Sangudo with limited assistance due to COVID. Thank you ladies for your hard work. The board recognizes the long hours our staff put in throughout the year, and your dedication to the organization does not go unnoticed.

We would like to thank Lac Ste. Anne County for offering us our new spaces. Our staff is now working from within the Lac Ste. Anne County office, and our shop facilities are located near Sangudo. The support we receive from all six of our municipal partners is vital to the success of our organization.

In closing, I look forward to another year of learning and being part of this great organization, full of innovative like-minded producers. If you have any questions or concerns about what we've been up to this past year, please don't hesitate to reach out to our staff or our board.

Grant Chittick, Board President

Manager's message

It's hard to believe another year has come and gone! 2019 presented many challenges to farmers and ranchers in the west central region once again. The challenges were numerous, but the resilience of our producers is admirable as they persevered through them all.

This year also saw significant changes in staff at WCFA. We had Jessica Stambulic join us in the spring as our Agronomy Technician, a new role for our organization. We also saw the departure of long-time Forage and Livestock Program Manager, Fito Zamudio Baca. In September, we had Jessica Watson return to us to fill her former role as Conservation Agriculture and Extension Program Coordinator, as staff roles adjusted with Melissa Freeman going on leave. Melissa's absence means I have taken on the huge challenge of the General Manager role and filling her shoes, which is no easy feat!

Unfortunately, the majority of our plot work this year succumbed to the elements and the excessive amounts of moisture we were challenged with. We were unable to collect data on most of our trials, and many were terminated due to poor performance. We are looking forward to next year being a better year.

2019 was an extremely difficult year on the funding front as well, as we did not receive our usual amount of core funding from Alberta Agriculture and Forestry. Thanks to the resilience and hard work of our team and our board, we are still operating today and the funding situation at WCFA looks significantly better. We are grateful to have had a number of our applications to the Canadian Agricultural Partnership (CAP) programs approved and are looking forward to getting these projects underway. Our staff attended consultations on the new farmer-led research initiative proposed by Alberta Ag in January. This initiative developed into an arms length organization that we now know as Results Driven Agriculture Research (RDAR). We look forward to working with this organization in the future and are optimistic for the opportunities it may provide to research that reflects the needs of producers.

I would like to express my gratitude and thanks to the staff here at WCFA for all of your hard work and commitment to the organization. Your ability to adapt under pressure while keeping a positive attitude is to be admired and is greatly appreciated! Although 2019 was a tough year, and 2020 has already thrown some challenges our way, the staff continue to persevere and keep up the great work that has contributed to WCFA's success over the last year. I would also like to thank all of the WCFA members for your continued support of the organization. I look forward to a new year working alongside our amazing staff and with our dedicated board of directors to provide continued quality service to our membership.

Rachael Nay
General Manager

2019 Board of directors

President	Vice-President	Treasurer	Secretary
Grant Chittick	**Brian Dickson**	**Greg Malyk**	**Therese Tompkins**
Mayerthorpe	Niton Junction	Stony Plain	Yellowhead County

Directors

Aren Skogstad	**Larry Kidd**	**Duane Movald**	**Frank Maddock**
Barrhead	Mayerthorpe	Breton	Entwistle
Rod Nikkel	**Brett Byers**	**Shayne Horn**	
Pickardville	Blue Ridge	Thorsby	

2019 WCFA Staff

General Manager

Melissa Freeman, BBA (January-October)

Rachael Nay, BSc. Ag (October- Present)

manager@westcentralforage.com

Agronomy technician

Jessica Stambulic, BSc.

agronomy@westcentralforage.com

Conservation agriculture & extension coordinator

Jessica Watson, BSc. Ag

conservationag@westcentralforage.com

Summer Field Technicians

Alex Hodgson

Chris Beck

ACKNOWLEDGEMENTS

Operation of West-Central Forage Association depends on support and cooperation from many groups and individuals. WCFA would like to extend our sincere appreciation to the many producer cooperators working with us to carry out projects. You play a very important role in our demonstration and research activities and contribute greatly to the success of these projects. We would also like to thank project advisors, cooperators, sponsors, funders and anyone else who has supported us throughout the year. Without the support and cooperation of so many individuals our programming would not be possible.

WCFA would like to acknowledge the following, who have contributed to WCFA in a variety of ways by providing funding, donations, inputs, partnered on projects or extension events, lent a helping hand when we needed it or whom provide support in other ways. Our sincere apologies for anyone we may have missed.

A&L Canada Laboratories

Agriculture and Agri-Food Canada (AAFC)

Agroforestry & Woodlot Extension Society (AWES)

Alberta Agriculture and Forestry

Alberta Beef Producers (ABP)

Alberta Environment and Parks

Alberta Environmental Farm Plan (EFP)

Alberta Fish and Wildlife

Alberta Forage Industry Network (AFIN)

Alberta Lake Management Society (ALMS)

Alex Fedko

Alley Kat Brewing Company

Alpine

ALUS Brazeau

ALUS Canada

ALUS Lac Ste. Anne

ALUS Parkland

Amanda Kroeker

Applied Research & Extension Council of Alberta (ARECA)

Bart Guyon

Battle River Research Group (BRRG)

Beef Cattle Research Council (BCRC)

BIXs (Business Info Xchange)

Bouius Custom

Brazeau County

Brian Palichuk

Byers Farms

Canadian Agricultural Partnership (CAP)

Canadian Hemp Trade Alliance (CHTA)

Canadian Round Table for Sustainable Beef (CRSB)

Canterra

CARA Soil Health Lab

Chinook Applied Research Association (CARA)

Churchill Land and Cattle

Country Junction Feeds

Cows and Fish

Dale Engstrom

Dale Kaliel

Dickson Farms

Do More Ag

Dr. Claire Ainsworth

Farm Credit Canada (FCC)

Farming Smarter (FS)

FarmRite

FBC

FG Genetics

Field Crop Development Centre

Foothills Forage and Grazing Association (FFGA)

Gateway Research Organization (GRO)

Grey Wooded Forage Association (GWFA)

Haney Farms

Jamie McAllister

Julie Robinson

Kidd Bros.

Kim Keller

Lac Ste. Anne County

Lakeland Applied Research Association (LARA)

Lakeland College

Land Stewardship Centre

Leduc County

Mackenzie Applied Research Association (MARA)

Manitoba Agriculture

Mastin Seeds

Merck Animal Health

Nisku Recreation Centre

North Peace Applied Research Association (NPARA)

Northstar Seed Ltd.

Nutrien Ag Solutions

Olds College

Parkland County

Patti Ganske

Peace Country Beef & Forage Association (PCBFA)

Performance Seed

Rylent Farms

Secan

SeedNet Inc.

Smoky Applied Research & Demonstration Association (SARDA)

Speare Seeds

Stony Plain Seed Cleaning

Sturgeon Valley Fertilizers Ltd.

Suzanne Rose

University of Alberta, Breton Plots

Verified Beef Production Plus (VBP+)

Western Ag Innovations

Westlock Seed Cleaning

Woodlands County

Yellowhead County

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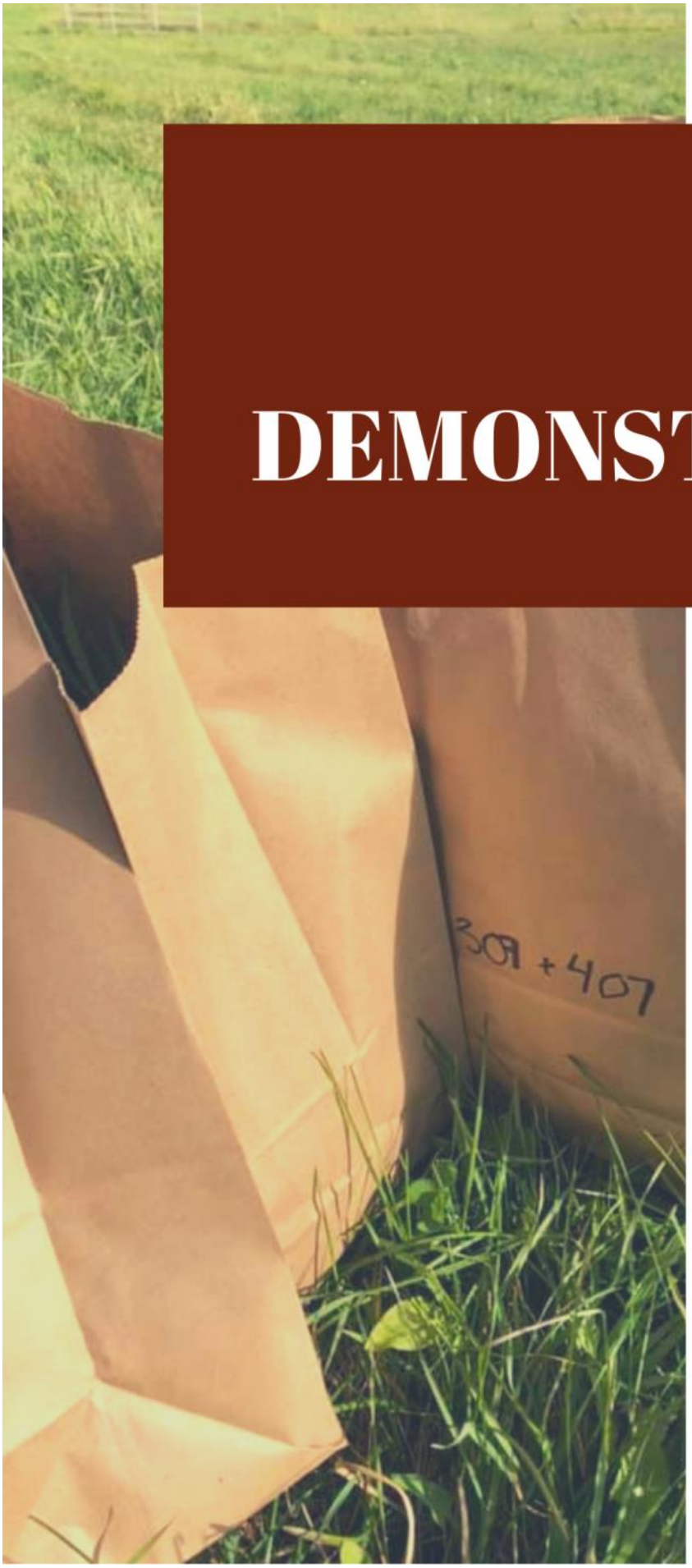

TRIALS & DEMONSTRATIONS

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National Industrial Hemp Variety Evaluation Trial

WCFA 2019 Report

J. Stambulic, WCFA

Introduction

In the last ten years the number of hemp producers has increased steadily in response to a growing hemp grain market (Alberta Agriculture and Forestry, 2017). As defined by the Government of Canada in the *Industrial Hemp Regulations*, industrial hemp includes Cannabis plants and plant parts, of any variety, that contains 0.3% tetrahydrocannabinol (THC) or less in the leaves and flowering heads (Government of Canada, 2018). Local hemp variety trials are highly informative for producers, as the performance of hemp varieties can vary from region to region. Hemp seed and oil are highly nutritious and hemp bast (skin/bark) and hurd (core) fibers can be used for a wide range of industrial applications including bio-composites, construction materials, textiles, insulation, bedding, paper production, ropes and twines and many others (Canadian Hemp Trade Alliance, 2020). Hemp can also be an excellent addition to crop rotations, as it has a large taproot, can scavenge soil nutrients left behind by previous crops, and can be used for carbon sequestration (Canadian Hemp Trade Alliance, 2020).

Generally, hemp requires 110 days for growth and 10-12” of rainfall throughout the season. Hemp is a sun-loving and warmth-loving crop, and does not tolerate excess soil moisture during establishment. Hemp should be seeded just 0.5-1” deep into a firm seed bed, and seeding should be avoided prior to heavy rainfall (Canadian Hemp Trade Alliance, 2020).

For more background information about industrial hemp, please visit the Canadian Hemp Trade Alliance website (http://www.hemptrade.ca) or download the Alberta Agriculture and Forestry Industrial Hemp Enterprise 2017 document (https://open.alberta.ca/dataset/153-830-1).

Growers are required to obtain an industrial hemp licence from Health Canada. For more information visit the Government of Canada’s industrial hemp licensing application guide at: https://www.canada.ca/en/health-canada/services/publications/drugs-health-products/industrial-hemp-licensing-application-guide.html.

The 2019 WCFA Hemp Variety Trial was completed in partnership with the Canadian Hemp Trade Alliance (CHTA), Alberta Agriculture and Forestry, Manitoba Agriculture, Brazeau County and Bart Guyon. This is a three year trial taking place from 2018-2020. The 2019 trial year consisted of 12 varieties with four replicates in a complete randomized block design. Six grain varieties and six dual-purpose varieties were assessed (Table 1).

Table 1. Summary of entries assessed in 2019 and their use as grain or dual-purpose varieties.

Variety	Type
CFX-2	Grain
CRS-1 (check)	Grain
Grandi	Grain
Judy	Grain
Katani	Grain
X59	Grain
Altair	Dual-Purpose
Anka	Dual-Purpose
CRS-1 (check)	Dual-Purpose
Petera	Dual-Purpose
Rigel	Dual-Purpose
Silesia	Dual-Purpose

Methods

The site was prepared with a herbicide pre-burn and rototilled. Soil test results were used to determine appropriate fertilizer application rates. Fertilizer was side-banded at seeding. Plots were seeded on June 12th into 15°C soil at a depth of one inch with a small plot Fabro disc drill in 5 rows at 22.5 cm (8.9 in) spacing. Plots were 9 metres long by 1.12 metres wide. Prepared seed bed was fluffier than desired. Emergence occurred June 26th despite heavy rainfall following seeding. Initially, weed pressure was high, as wet conditions during establishment results in stunting of hemp seedlings. Plots were weeded by hand in late July to remove weed pressure. Once plants were established further weeding was not required.

Data was collected for seedling mortality, plant vigour (relative), height, lodging, disease, male to female plant ratio, grain yield, and fibre yield (dual-purpose varieties only).

Seedling Mortality

Seedling mortality of approximately 30% is common during hemp seeding (Canadian Hemp Trade Alliance, 2020). Plant counts were conducted after 100% emergence and again once stem elongation had occurred. All plants within each plot were counted using a hand-held tally counter.

Vigor

Plant vigor was visually assessed by field staff approximately 45 days after seeding. Vigor was assessed on a relative scale of 1-10, the most vigorous plot in each grain/dual-purpose trial was regarded as a “10” and each subsequent plot was rewarded a rating in comparison.

Height

Plant height was assessed approximately one week prior to fibre harvest. Height was measured on five representative plants per plot from ground to the top of inflorescence using a measuring tape.

Lodging

Lodging was assessed approximately one week prior to fibre harvest on a visual scale of 1-5, (1= fully erect, 3=45 degree angle, and 5= laid flat on the ground).

Disease

Disease was recorded on incidence (number of plants affected in 2m of row at the front and back of plot staring 1m from plot end) and severity (visual rating on a scale of 0-5 and the % of heads infected for each identified incidence rating).

Male to Female Plant Ratio

Male to female plant ratios were assessed approximately one week prior to fibre and non-narcotic cannabinoid (NNC) harvest. The total numbers of male and female plants were counted in each plot using a hand-held tally counter.

Grain Yield

Ideally, grain sample collection for yield would have occurred when 70% of seeds were ripe. However, only about 50% of seeds had ripened when first frost occurred, and plants did not mature further. Seeds heads from the middle rows totalling three square meters were harvested by hand. Seed heads were dried, hand threshed, and weighed.

Fibre Yield

Fibre samples for yield were to be collected approximately 10 days prior to grain harvest. A total of one square meter of plants was hand-cut 3” above the ground from each plot. Wet weight, dry weight (with leaves), and dry stem weight (leaves stripped) were recorded per plot. Samples were bundled and transported to the WCFA shop where wet weights were measured and recorded. Bundles were laid flat and air dried for 10 days. Bundles were turned once daily to allow for even drying. Once dry, bundle weights were recorded with and without leaves.

Results and Discussion

A note about data quality: It is important to note that there were significant differences between replicates in the 2019 variety trial. As a result, the compiled data has large standard deviation values, meaning the range of data is wide, and imprecise. Therefore, the 2019 results are imprecise.

Crop Quality

Seedling Mortality

Seedling mortality counts occurred on July 9th (initial count) and Aug 7th (mortality count). Overall, the CRS-1 check varieties had the lowest mortality rates in both the grain and dual-purpose categories with average rates of 10% and 16%, respectively. Of the grain varieties Judy experienced the lowest mortality rate of 13%, while Grandi experienced the highest morality rate of 27%. Of the dual-purpose varieties, Rigel experienced the lowest mortality rate of 18%, while Altair experienced the highest mortality rate of 31% (Figure 1). A mortality rate of 30% is commonly accepted for dual-purpose varieties, as seeding rates are often increased to produce thinner stalks for higher quality fibre production (Canadian Hemp Trade Alliance, 2020). Adverse seeding conditions such as seeding too deep, poor growing conditions at seeding, cracking of the seed coat,

toxicity from high rates of seed placed fertilizer, and residual herbicides from previous crops can result in seed mortality rates between 10-70% (Canadian Hemp Trade Alliance, 2020). It is likely that the cool, wet conditions following seeding greatly contributed to the 2019 trial mortality rates.

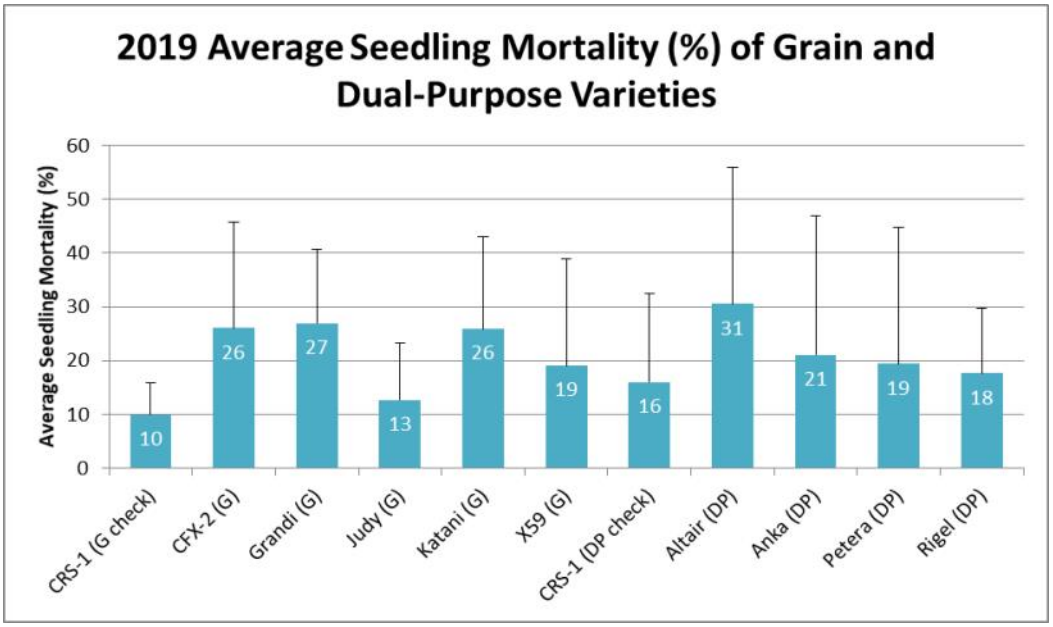

Figure 1. 2019 Average Seedling Mortality (%) of grain and dual-purpose varieties. G=grain, DP= dual-purpose.

Vigor

Plant vigor was assessed July 29th. Averaged values for relative vigour resulted in low values of variation between varieties (Figure 2).

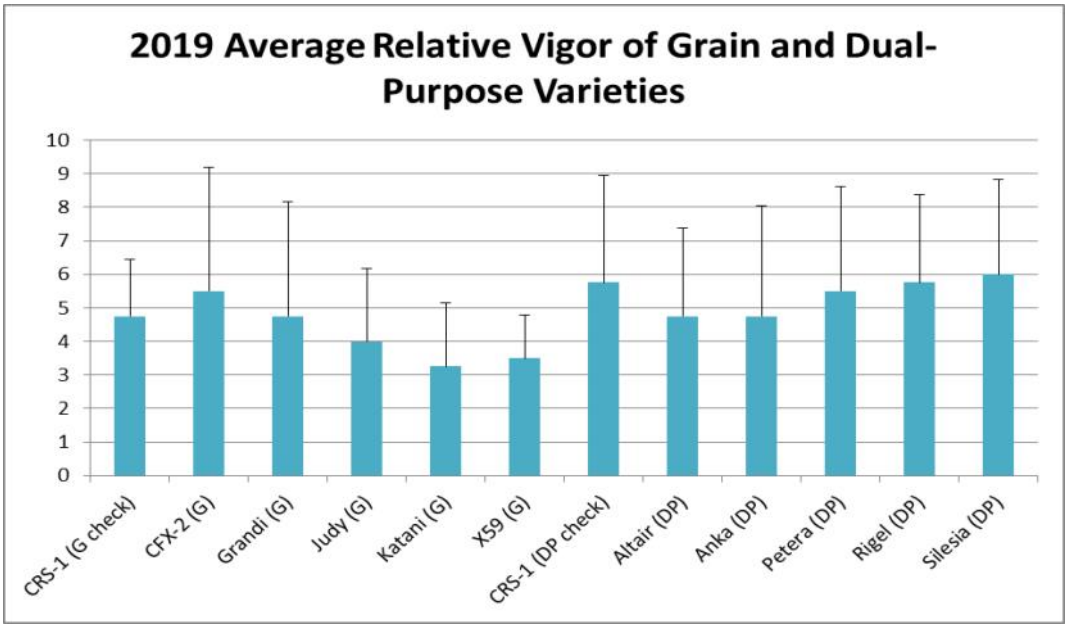

Figure 2. Early vigour (relative) of 2019 grain and dual-purpose industrial hemp varieties.

Height

Plant height was assessed September 27th. Of the grain varieties, Judy was tallest with an average height of 88cm (34”), and X59 was the shortest with an average height of 57cm (22”). Of the dual-purpose varieties, Petera was tallest with an average height of 157cm (62”), and CRS-1 was shortest with an average height of 93cm (36.5”) (Figure 3).

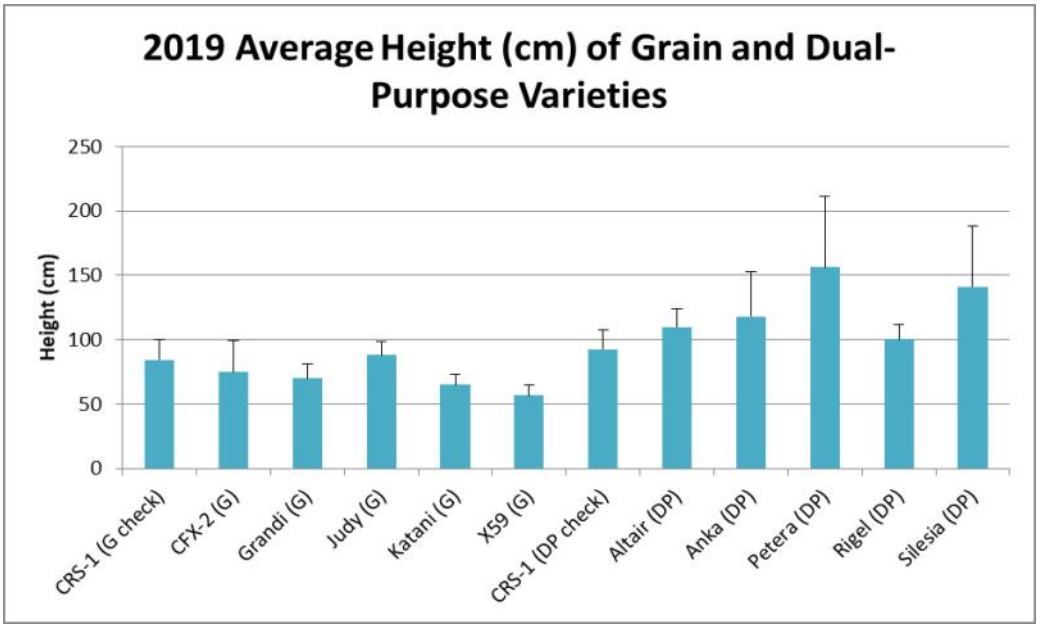

Figure 3. 2019 average height of grain and dual-purpose varieties.

Lodging

Plant lodging was assessed September 27th. No notable lodging was observed in any plots.

Disease

Despite the cool, wet conditions throughout the growing season, no incidence of disease was noted in any plots.

Male to Female Plant Ratio

Male to female plant ratio was assessed on September 27th. Varieties can be either monoecious of dioecious. In monoecious plants, the plant population has both male and female plant parts on the same head. In dioecious plants, the plant population is made up of pure female heads and up to 50% male heads (Canadian Hemp Trade Alliance, 2020). Of the grain varieties, CRS-1 had the highest male population of 42%, while Katani had the lowest male population of 25%. Dual-purpose varieties had low male populations, between 0.7-4.6%, with the exception of Petera with a male population of 38% (Figure 4).

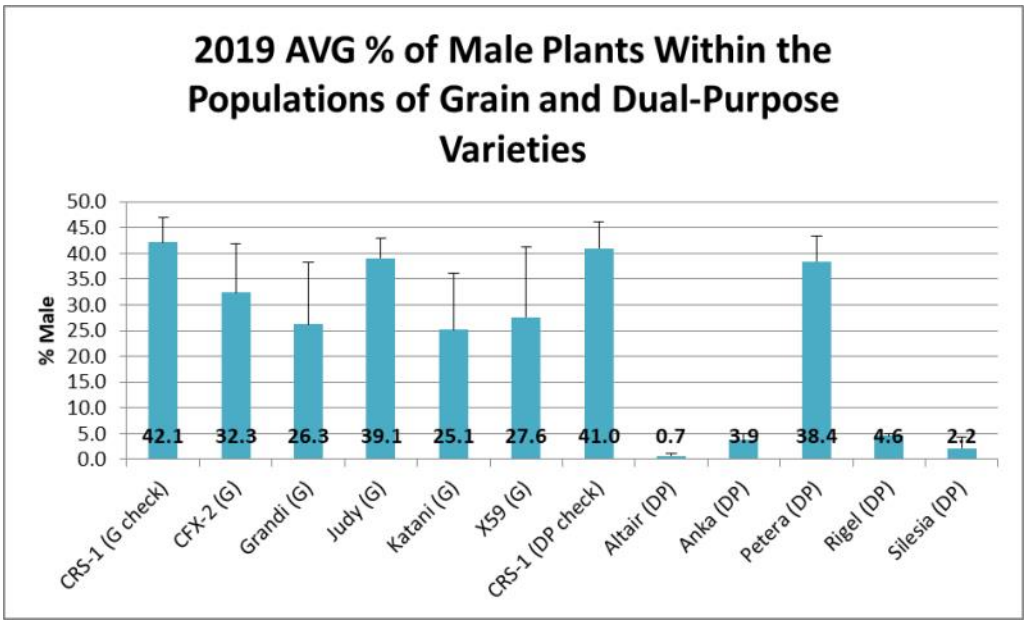

Figure 4. 2019 average percentage of male plant population for grain and dual-purpose varieties.

Grain Yield

Grain samples were collected October 10th. Grain yield varied highly between replicates; therefore the accuracy of the resulting data is low. Of the grain varieties, CFX-2 produced the highest yield of 107 lbs/acre, while Judy produced the lowest yield of 36 lbs/acre. Of the dual-purpose varieties, CRS-1 produced the highest yield of 86 lbs/acre, while Petera produced the lowest yield of 5 lbs/acre (Figure 5). Petera is currently marketed exclusively as a fibre variety.

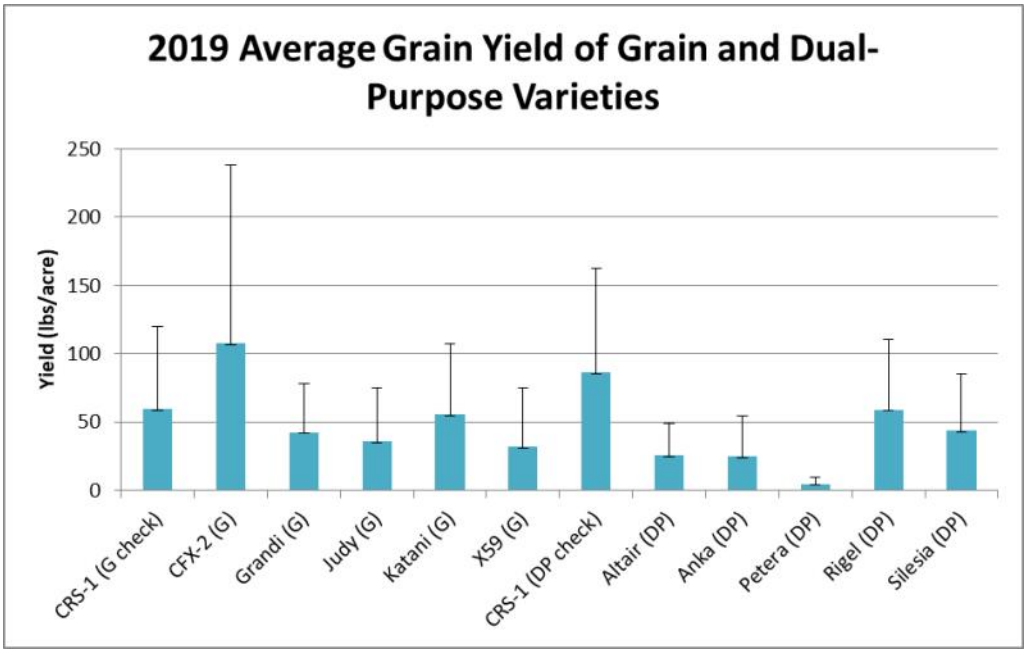

Figure 5. 2019 average yield of grain and dual-purpose varieties (corrected to 10% moisture). Important: error is high for this calculation, note the large standard of deviation bars.

Fibre Yield

Fibre samples were collected October 2nd from dual-purpose varieties only. Fibre yield varied highly between replicates; therefore accuracy of the resulting data is low. Petera was the highest yielding variety, yielding 642 lbs/acre, while CRS-1 was the lowest, yielding 236 lbs/acre (Figure 6).

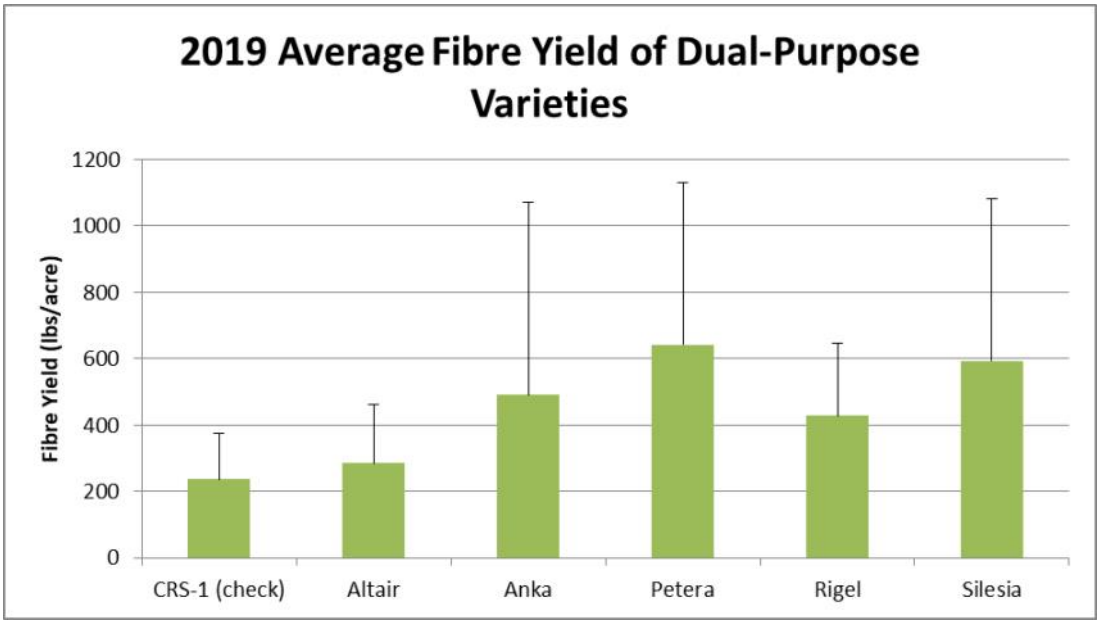

Figure 6. 2019 average fibre yield (dry) of dual-purpose varieties.

Environmental Records

All weather data was retrieved from the Violet Grove Alberta Climate Information Service (ACIS) weather station, which is nearest to the Brazeau County Plot Site, and will be referred to as “Brazeau” throughout this report. Environmental data can be found in the appendix of this report.

Temperature

The average temperature of the growing season (May 1st to October 2nd) in Brazeau was 12°C (54°F) with a low of -2°C on May 4th and a high of 19.5°C on August 21st. First frost occurred on September 28th .

Precipitation

The 2019 growing season is the second wettest in the last ten years, with an accumulated precipitation of 413mm (16.3”) (Figure 9). June received the most rainfall, 180mm, most of which occurred in the latter half of the month, following seeding. Though 2019 was not the wettest year on record, the significant rainfall in June considerably affected plant development.

Summary

The 2019 WCFA hemp variety trial experienced less than ideal climatic conditions for growing hemp. The high amounts of rainfall and cool temperatures experienced throughout June and July, as well as the rest of the growing season, significantly affected the growth and maturity of the plants. Data collected from the trial was highly variable. This was year two of the three-year trial. The combined data from the Canadian Hemp Trade

Alliance national trial will provide much more reliable data upon completion of the trial in 2020/2021. WCFA would like to thank our partners the Canadian Hemp Trade Alliance, Alberta Agriculture and Forestry, Manitoba Agriculture, Brazeau County and Bart Guyon.

References

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WCFA Corn Variety Trial

2019 Report

J. Stambulic, WCFA

Introduction

The purpose of this trial was to evaluate corn varieties for maturity, quality and yield as well as to demonstrate varieties of corn that can be successfully grown for forage in the west central area. The results of this trial will be used to provide valuable local information to cattle producers intending to grow corn for winter grazing or silage. The 2019 WCFA corn variety trial was conducted at the WCFA Brazeau County research site. This trial was completed in partnership with Northstar Seed Ltd., Nutrien Ag Solutions, Performance Seed, Brazeau County, Bart Guyon and Bouius Custom Work. The 2019 trial included four silage corn varieties; one conventional and three Roundup-Ready.

Methods

The 2019 WFCA corn variety trial was conducted at the Brazeau County research site (NW-14-49-09-W5). Four varieties with various Corn Heat Unit (CHU) requirements were seeded (Table 1). Seedbed was prepared with a glyphosate pre-burn, disked, and tilled. Plots were seeded on June 14, using a John Deere corn planter at a rate of 30,000 seeds/acre. Plots were 10x20 meters consisting of 12 rows spaced at 30”. Granular 46-0-0 was broadcast applied at a rate of 102lbs/acre one week after seeding. One combination glyphosate (1L/acre) and fertilizer (7-14-5 at 1L/acre) spray was applied at the four leaf stage to all varieties. Weeds were also mechanically controlled after plants matured beyond the four leaf stage.

Table 1. Summary of varieties, suppliers, CHU and DRM.

Supplier	Variety	Corn Heat Units (CHU)	Days to Relative Maturity (DRM)
Northstar Seed Ltd.	LR 99S77 RR	2310	77
Northstar Seed Ltd.	LR 9073 RR	2200	73
Nutrien Ag Solutions	PV 60075	2125	75
Performance Seed	De Dell Defrost	2000	67

Unfortunately, due to a miscommunication within WCFA the conventional variety, De Dell’s Defrost, suffered an approximate 60% mortality rate following the glyphosate spray. As a result, no samples were collected from this variety.

Sampling for yield and quality was intended, however, due to the late planting date and cool, wet growing season plants did not mature beyond the leaf stage, and no tasseling or cob formation occurred (Figure 1). Additionally, an early frost and initial snowfall followed by warm weather caused significant damage to plants

(Figure 2). Plants were highly saturated with snowmelt and, as a result, attempts to estimate yield were unreliable and will not be included in this report. On October 2nd composite feed quality samples were collected from each plot, consisting of five plants selected on a diagonal transect across each plot. At the time of collection samples were saturated with snow melt. Due to the excess moisture, samples were air dried prior to shipping to avoid degradation in transit. Samples were submitted to A&L Canada Laboratories Inc. (A&L) for feed quality testing the following week.

Figure 1. A representative LR 9073 plant on September 12, 2019 at the R10 stage, which was the maximum maturity reached in 2019.

Figure 2. The LR 9073 plot on October 2 following snowfall and melt.

Results and Discussion

Environmental Records

All weather data was retrieved from the Violet Grove Alberta Climate Information Service (ACIS) weather station, which is nearest to the Brazeau County site, and will referred to as “Brazeau” throughout this report. Environmental data can be found in the appendix of this report.

Temperature

The average temperature of the growing season (May 1st to October 2nd) in Brazeau was 12°C (54°F) with a low of -2°C on May 4th and a high of 19.5°C on August 21st. First frost occurred on September 28th.

Corn Heat Units

Corn heat units (CHU) are a measurement of cumulative heat over the growing season. CHU are calculated daily and accumulates as the growing season progresses. CHU are calculated using the equation below:

$$CHU = [1.8(\text{daily min temp} - 4.4) + 3.3(\text{daily max temp} - 10) - 0.084(\text{daily max temp}) - 10)2]/2$$

The long-term normal CHU for the growing season in Brazeau is 1818.2, while the CHU for 2019 was 1916.3 (ACIS, 2019). From seeding to harvest (June 13-Oct 2) Violet Grove reached 1,521.1 CHU. Varieties in the trial ranged from 2000-2130 in CHU requirements (Table 1).

Precipitation

The 2019 growing season is the second wettest in the last ten years, with an accumulated precipitation of 413mm (16.3”) June received the most rainfall, 180mm, most of which occurred in the latter half of the month, following seeding. Though 2019 was not the wettest year on record, the significant rainfall in June significantly affected the plant development. When excessively wet soil conditions occur during stage 1 of plant development, the maximum-reduction in corn yields occur (Kanwar, Baker, & Mukhtar, 1988).

Feed Quality

Composite samples consisting of five plants per plot were collected on October 2nd. At the time of collection the majority of plants had soaked up excess water from the recent snowmelt and were lying flat. Due to the external source of moisture, attempts to determine yield would have resulted in inflated tons/acre and therefore false values. Additionally, plants only reached the R10 maturity stage, and no cob formation occurred (Figure 2- A representative LR 9073 plant on September 12, 2019 at the R10 stage, which was the maximum maturity reached in 2019). Samples were submitted to A&L after air drying for one week, to prevent sample degradation during shipping. Upon receiving the feed quality analysis reports, WCFA staff consulted with industry professionals regarding the results. It was determined that the values reported after analysis were not sufficient to confidently make any feeding recommendations. Full copies of the feed analysis reports can be found in the appendix (pp 52-57).

Summary

Regional variety trials provide invaluable information for local producers. The 2019 WCFA corn variety trial at the Brazeau research site was an excellent demonstration of how, regardless of variety selection, crop management is crucial to success. The combination of the late seeding date, low CHU and excessive soil moisture during early development, resulted in low quality and poor yield across all varieties within the trial. Although the 2019 trial was less successful than previous years, it demonstrates why local applied research data is invaluable to local producers, due to the variation of localized climate and weather in the west central region.

References

ACIS. (2019). *Alberta Climate Information Service (ACIS)*. Retrieved December 2, 2019, from Alberta Agriculture and Forestry: https://agriculture.alberta.ca/acis/

Kanwar, R. S., Baker, J. L., & Mukhtar, S. (1988). Excessive Soil Water Effects at Various Stages of Development on the Growth and Yield of Corn. *Transactions of the ASAE*, 133-141.

WCFA 2019 Additional Trials Recap

J. Stambulic, WCFA

Introduction

2019 was a difficult growing season for many producers across Alberta. Lac Ste. Anne County, Leduc County, and the County of St. Paul all declared states of agricultural disaster as a result. WCFA's research plots were not exempt from the poor conditions and many of the 2019 trials were deemed unsuccessful. As a result, few samples for quality or yield were collected. The Alberta Agriculture and Forestry (AAF) "final 2019 Alberta crop report" reported 89.9% of all crops in Alberta were harvested. In the report AAF also notes that producers will likely face losses on yield and quality and be faced with the difficult task of cleaning up the unharvested acres in the spring. To view all the 2019 Alberta crop reports visit: https://open.alberta.ca/publications/2830245.

Winter Cereal Variety Trial

The objective of the 2019 winter cereal variety trial was to determine the yield and quality of winter cereal varieties and document the effect of "early" and "late" planting dates on yield and quality. The trial consisted of 18 varieties of fall rye, wheat, and triticale to be seeded as two blocks: June ("early") and July ("late"). "Early" blocks were seeded June 5th at Wildwood and June 15th at Brazeau. Due to wet conditions, seeding of the "late" plots was not possible at either site. Weed pressure was high at both sites, and weed control was difficult due to wet conditions. Varieties in the "early" block did not reach maturity and yield/quality samples were not collected.

Figure 1. Brazeau winter cereals on July 17, 2019

Figure 2. Wildwood winter cereals on July 15, 2019

Regional Silage Variety Trial

The 2019 Regional Silage Variety Trial was conducted in partnership with SARDA Ag Research (SARDA), Chinook Applied Research Association (CARA), Peace County Beef and Forage Association (PCBFA), Lakeland Agricultural Research Association (LARA), Gateway Research Organization (GRO), North Peace Applied Research Association (NPARA), MacKenzie Applied Research Association (MARA), Battle River Research Group (BRRG), Foothills Forage and Grazing Association (FFGA), and Farming Smarter (FS). The objective of the trial was to provide current and comprehensive regional yield and quality data on annual forage varieties across Alberta. The trial consisted of barley, triticale/wheat, oats, and pea+cereal mixture blocks. Plots were seeded June 5, 2019. Wet conditions in June and July resulted in poor establishment and many plants exhibited signs of moisture stress. Due to the wet, cool conditions the trial plants did not reach maturity. As advised by the trial coordinator, no samples were collected from the site, as the resulting data would be unreliable due to varied emergence and poor plant health.

Figure 3. A Barley Rep exhibiting signs of moisture stress, July 29, 2019

Regional Perennial Forage Variety Trial

The regional perennial forage variety trial, officially named the “Study of Longevity of Selected Perennial Forage Varieties and Mixes” was conducted in partnership with Chinook Applied Research Association (CARA), Gateway Research Organization (GRO), Lakeland Agricultural Research Association (LARA), Mackenzie Applied Research Association (MARA), and Peace Country Beef and Forage Association (PCBFA). The objective of this project was to provide farmers and ranchers with performance information on establishment (years 1-3) and longevity (years 3-6). Blocks of grasses, mixes, sainfoin & cicer milkvetch, and alfalfa were seeded June 4, 2019. Unfortunately, due to seeding depth, weed pressure and wet conditions establishment was exceptionally poor. Upon advisement from the trial director the trial was abandoned for 2019 with plans to try again in 2020. The trial was ultimately terminated and will be re-seeded in 2020.

Figure 4. A well-established plot from the "grasses" block. July 29, 2019.

Figure 5. An overview of the “sainfoin and cicer milkvetch” block, July 29, 2019.

Intercropping Demonstration

The 2019 intercropping demonstration was conducted in partnership with Northstar Seed LTD. The objectives of this trial were to determine the differences in yield and quality amongst intercropping options. Plots were seeded in Wildwood on June 11th and Brazeau on June 12th 2019. Treatments consisted of "check" monocrops (barley, clover, peas, hairy vetch, Italian ryegrass, wheat, oats, forage brassica, berseem clover, sorghum sudangrass and sun hemp) and intercrops (peas/wheat, hairy vetch/Italian ryegrass, oats/ brassica, sorghum sudangrass/clover, barley/sun hemp).

Due to wet conditions following seeding and throughout June and July, establishment was poor and plants were stunted. Establishment of sorgum sudangrass and sun hemp was particularly poor at both sites. Due to poor establishment and plant stunting, no yield or quality samples were collected for this trial.

Figure 6. A forage brassica mix plot in Wildwood, July 20, 2019.

Figure 7. The Wildwood sun hemp monoculture plot. Sun hemp establishment at this site was not successful. Photo taken July 29, 2019

LIVESTOCK PROJECTS

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Evaluating Sire-Progeny Links, Breeding Plans and Information Management in Multi-Sire Breeding Scenarios on Commercial Herds

Status Report, 2019

J. Watson, WCFA

Introduction

One of the more commonly used natural breeding systems in commercial herds is the multi-sire system. One of the major disadvantages to this system, however, is that producers are often unaware of which bulls are siring calves. The use of genetic technology to assign parentage may allow producers to determine which bulls have sired calves.

The assumption in these systems is that each bull is breeding an equal number of cows. However, without identifying which bulls are siring calves, it is impossible to know with certainty if this is the case. The introduction of desirable genetic traits in commercial herds is typically achieved through purchase of bulls. By linking bulls to their offspring, producers can better evaluate if they are achieving the desired outcomes of their breeding plans in multi-sire herds.

This multi-year project will demonstrate the benefits of a systematic approach to breeding and how sire-progeny and other herd performance information can be used to generate measurable productivity and profitability improvements.

Materials and Methods

Collaborators

In total, seven herds are evaluating the use of the Q-link bull performance and herd improvement tool from Quantum Genetix. This technology is able to link sires to their offspring through genetic testing.

WCFA is responsible for coordinating with five local herds, with the other two herds associated with Olds College and Lakeland College. Information provided in this report refers specifically to the five herds associated with WCFA. Data analysis will be for all seven participating herds. BIXs has partnered on the project to provide data storage and compilation services.

Data Collection

DNA Sample Collection

In total 32 bulls and 343 calves were sampled for DNA analysis in the first year of the project (note: one producer sampled bulls but did not sample any calves). Each rancher was asked to provide a minimum of 100 calves, if possible, for DNA testing.

All sires were sampled using the Quantum Genetix Hair Collection Procedure (Appendix). Approximately 20 tail hairs with follicle attached were obtained from each bull, sealed in an envelope and sent to the lab for analysis.

Calves were sampled using a tissue applicator and the Quantum Genetix Ear Tissue Collection Procedure (Appendix). Samples were collected during other management activities, such as branding or weaning. Tissue samples were kept frozen until delivery to the lab for analysis.

Figure 1. Tissue sampling supplies: tissue collection tool (blue), tissue collection tags, punches for tissue collection (orange). The cooler contains samples ready to be shipped to the lab.

Breeding Soundness Evaluation

Prior to the breeding season a breeding soundness exam was conducted by a licensed veterinarian on all sires participating in the test groups. All bulls were required to pass the evaluation and test negative for venereal diseases in order to be enrolled in the project.

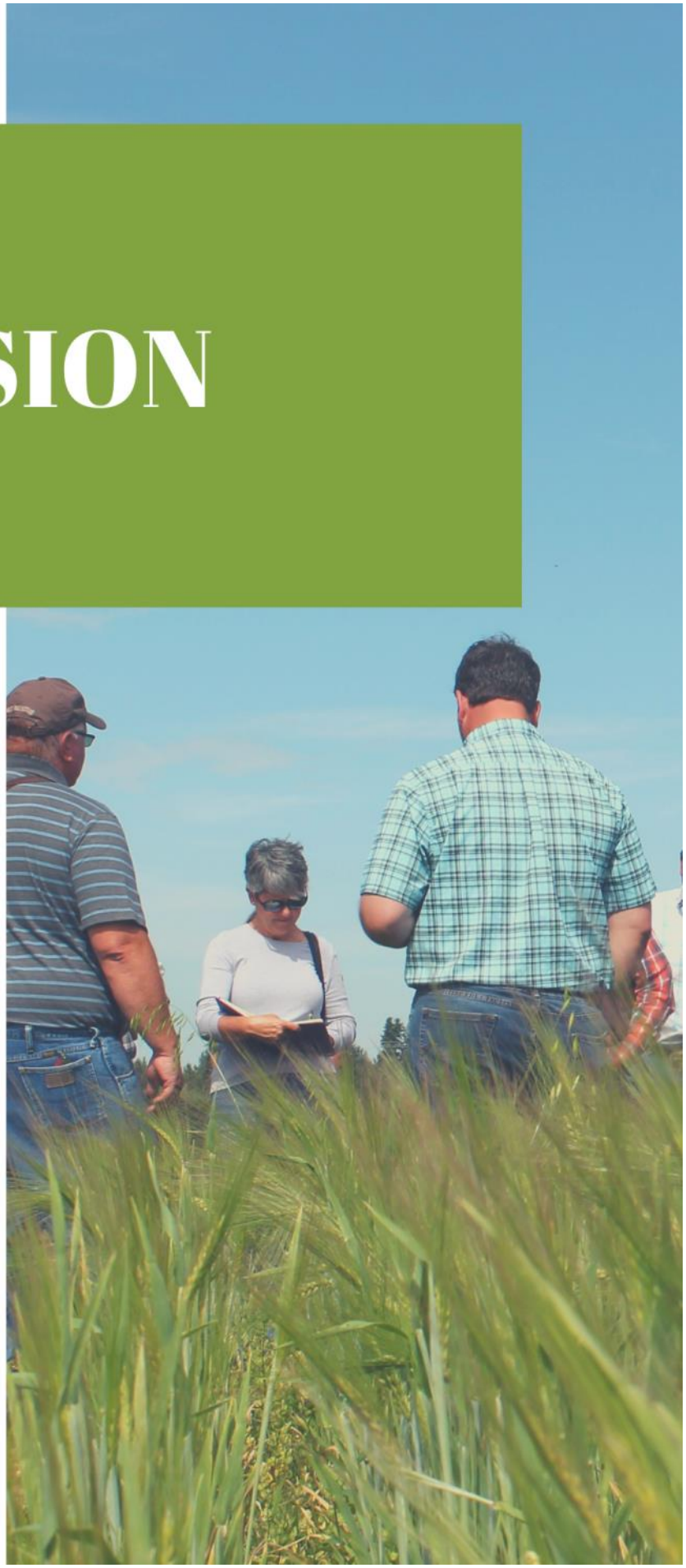
Production Data

Additional data was collected from each participating ranch to support economic analysis and data interpretation. Individual weaning weights for all calves that were DNA tested were collected for some herds. Individual weights for dams and body condition scores at time of weaning were collected for some herds. It was discovered that some of the participating ranches were unable to provide us with this information due to limitations within their handling systems. Ranchers were also asked to provide information regarding calving ease, losses, abortions, length of calving and breeding seasons, etc. Expected Progeny Differences (EPDs) were submitted for all bulls in the test groups.

Results and Discussion

As this was the first year of the project, the primary focus was on familiarizing participants with data collection procedures and record keeping expectations. Due to some equipment issues at the lab, there were significant delays in receiving the parentage results. A statistical analysis will be performed on the data for all seven herds, collectively, once all the data has been compiled. A contractor has been brought on to do some production and economic analysis of results as well. Reports on results will be made available as they completed. Data collection for this project is expected to continue into 2022.

EXTENSION



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2019 Extension & Member Services Highlights

Ladies' Ranching Retreat *March 1, Nisku*

The second annual Ladies' Ranching Retreat event featured Keynote speaker Patti Ganske and a beer tasting by Alley Kat Brewing Company. Participants were given the opportunity to listen to presentations on herd health, intensive grazing, the horse's hindgut microbiome and mental health in Agriculture. The ladies' were able to get their hands dirty with a hands-on demonstration from Dr. Claire Ainsworth, as seen in the photos on the right. A small tradeshow of local vendors was available for attendees to shop and plenty of opportunities to network were provided.

WCFA's Annual General Meeting *March 19, Darwell*

Along with the regular business meeting of the membership, WCFA staff provided updates on projects and activities from 2018 and an overview of plans for 2019. Supper and live music closed out the evening. Two new members were elected to the board of directors by the membership present.

Pond Days *June*

Each year, through the Stewardship Alliance for Conservation Agriculture (SACA), we partner with municipalities and local schools to deliver Pond Days to Grade 4/5 students. This program gives students to the opportunity to spend the day outside the classroom engaging in hands-on learning activities on a variety of topics from invasive species, soil health, water quality, riparian areas, aquatic insects, and others. In 2019, we hosted three Pond Days in June in cooperation with Woodlands County, Yellowhead County and Parkland County.

Classroom Agriculture Program *April*

Each year WCFA staff volunteer with the Classroom Agriculture Program to deliver presentations to Grade 4 students at a number of local schools. Presentations are tailored for each class and cover Agriculture related topics, such as soil health, and crop & livestock production. In 2019 a total of seven presentations were delivered at four schools (Evansview, Wildwood, Aurora and Eldorado).

Verified Beef Production Plus (VBP+) Workshop *June 13, Mayerthorpe*

On June 13, 2019 at the Diamond Centre in Mayerthorpe producers were given the opportunity to learn more about the VBP+ program and how to become certified. Our local VBP+ Coordinator, Yvonne Churchill, was on hand to discuss the process and how to enroll. Local feedlot Titan Land and Cattle described their experience in becoming VBP+ certified and BIXs provided information on the Canadian Beef Sustainability Acceleration Pilot.

Regenerative Ranching and Farming with Gabe Brown *August 20 & 21, Entwistle*

We hosted renowned regenerative agriculture speaker Gabe Brown in August. Gabe shared his thoughts on soil health, cover crops, intercropping, and beneficial grazing management techniques. Attendees were given the opportunity to tour WCFA's small plot research sites with Gabe as well.

Lake Health Day *August 23, Shiningbank Lake*

As part of the Shiningbank Lake Community Stewardship Initiative, a Lake Health day was hosted at the Shiningbank Lake day use area on August 23. Information was provided from the Agroforestry and Woodlot Extension Society, Alberta Lake Management Society , AB Environment and Parks, WCFA, Alberta Fish and Wildlife and Cows and Fish to attendees throughout the day. More information on this project can be found on pages 37 and 38.

Fall Seminar Series *October & November, Entwistle*

In the fall of 2019 we hosted a four part series of evening workshops. Each of the four seminars were very well attended and focused on timely topics.

1) **Supplementing Low Quality Forages in Beef & Sheep Rations** *October 16*
   Nutritionist Dale Engstrom discussed supplementing low quality forages, the importance of feed testing and briefly demonstrated the Cowbytes software.
2. **Making Profit-Based Choices for Your Farming Operation** *October 30*
   Dale Kaliel discussed decision making on the farm and went over some techniques, such as partial budgets, that could be used to evaluate the effectiveness and feasibility of implementing potential changes.
3. **Maintaining a Healthy Herd** November 13
   Suzanne Rose of Merck Animal Health covered a variety of herd health topics, including the use of implants and treating & preventing scours in calves.
4. **Forage Planning** *November 27*
   Brian Palichuk with Northstar Seed Ltd. discussed a number of ways in which you could extend your grazing season, variety selection, pasture rejuvenation and many other tips and tricks for getting the most out of your grazing.

Leduc County Feed Quality Concerns in Livestock Rations *November 14, Leduc County*

Ruminant nutritionist Jaime McAllister from Country Junction feeds discussed a number of timely and useful bits of information on rations and feed testing with producers at the Telford Community Hall in Leduc County. We were able to bring this workshop to Leduc area producers through our partnership with Leduc County.

Brazeau County Environmental Farm Plan Workshop *November 20, Brazeau County*

Brazeau County asked WCFA to participate in an Environmental Farm Plan workshop hosted at the County office in November. Jessica W., one of our EFP Technicians, facilitated the workshop and assisted attendees with beginning their own EFPs. A number of farms were able to begin their EFPs at this workshop.

Western Canada Conference on Soil Health & Grazing *December 10-12, Edmonton*

The Soil Health and Grazing Conference is held every two years and has participants travel from all over western Canada to attend. WCFA works with a number of other organizations as part of the planning committee. The sold out conference gave participants to the opportunity to hear scientists, specialists and other producers discuss soil health and grazing topics. The speaker line-up included Gabe Brown, Allen Williams, Dr. Yamily Zavala, Dr. Nichols, Kimberly Cornish and too many others to list. The producer panels were one of the highlights for many attendees. All of WCFA's staff were in attendance at the conference, with our tradeshow booth, giving them the opportunity to connect with new people and interact with many of our long-time members.

Newsletters

A regular newsletter, titled "Forage Views", containing information relevant to the local area on a number of forage, livestock and environmental topics, as well as updates on WCFA's projects and activities is produced by WCFA. Four issues were produced in 2019 and each issue was delivered to over 200 producers and industry contacts.

Social Media

Information is regularly shared through our various social media channels. In 2019 the WCFA website had over 12,000 page views. Our social media following continued to grow in 2019. At the end of 2019 we had over 700 Facebook followers, over 800 Twitter followers, and over 200 followers on Instagram. Subscriptions to the email distribution list grew as well, with over 300 contacts at the end of 2019. The email list is used to distribute important updates about events and share information of interest to our subscribers.

Facebook: West-Central Forage Association
Twitter:@WestCentralFor
Instagram: @westcentralforage
Website: www.westcentralforage.com
Email: info@westcentralforage.com

Canadian Agricultural Partnership (CAP) Applications

WCFA staff are available throughout the year to assist producers with funding applications to the CAP suite of programs, including the Environmental Stewardship and Climate Change and the Farm Water Supply programs. A number of producers were assisted with their applications in 2019. More information on CAP can be found at www.cap.alberta.ca.

Environmental Farm Plans (EFP)

WCFA works with Alberta EFP to deliver the EFP program in our local area. WCFA has EFP Technicians on staff to assist producers through the entire EFP process. Over 20 individuals were assisted with EFPs by our technicians in 2019.

Feed and Soil Analysis

WCFA provides forage and soil probes for use by our members, as well as facilitation of analysis of feed and soil. We work closely with A&L Labs to provide analysis of samples, and are able to offer a discounted rate on feed analysis to our members. 2019 was a busy year for feed analysis and our forage probes were in high demand.

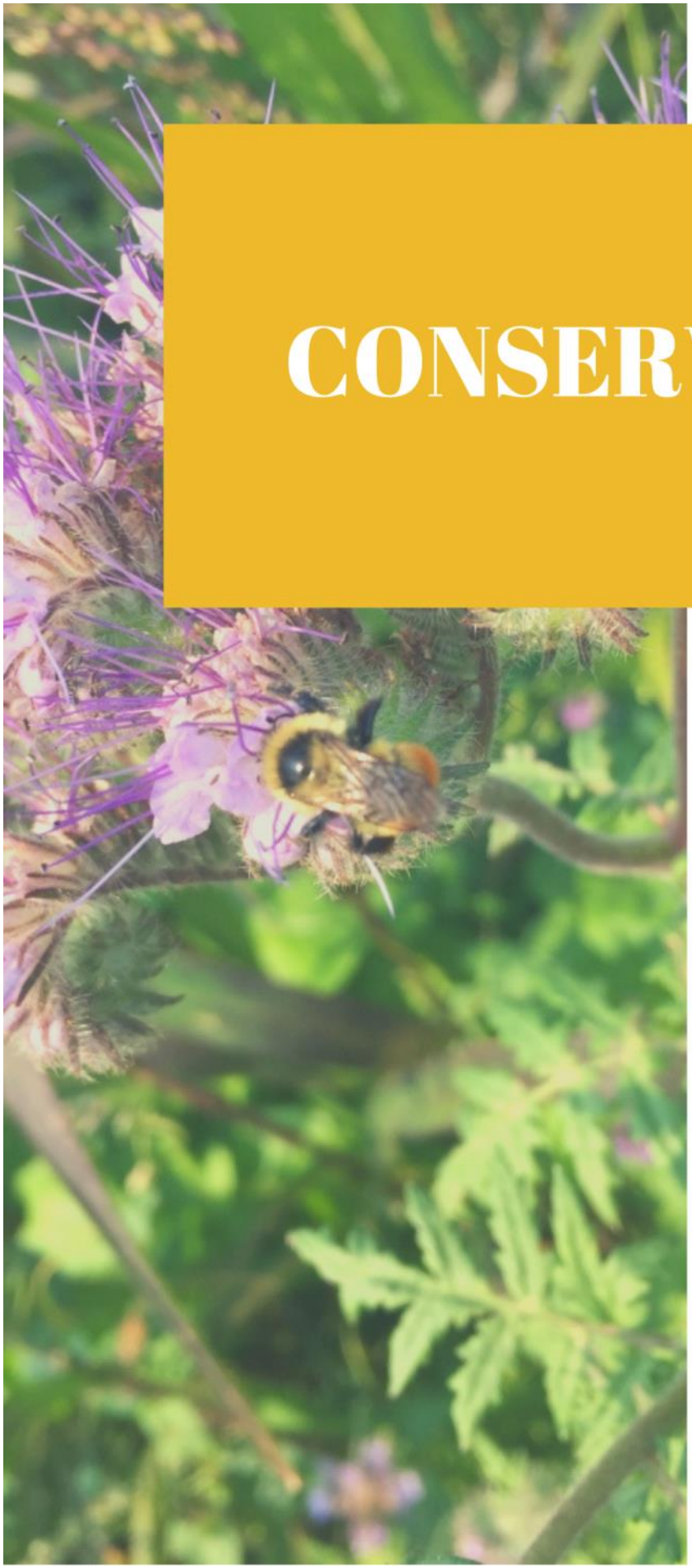
Age Verification

Many producers were assisted with age verifying their animals through CCIA's Canadian Livestock Tracking System (CLTS). WCFA is a third-party provider and we are able to submit information to the system on behalf of producers.

Rental Equipment

WCFA has a number of different pieces of equipment and technology available for members to rent throughout the year. Once again, a number of producers accessed this program. 2019 saw an increase in the number of producers using the forage probes. Other rental items include soil probes, a pneumatic fence stapler, an alleyway scale, a tru-test scale indicator, a tru-test RFID reader, and wire-rollers.

WCFA would like to thank all those that supported our extension activities this year through sponsorship, financial support, presenting at or attending an event, interacting with us on social media, reading our newsletters, or any other way in which you supported our efforts. We would be unable to host successful events without the support we receive from so many different sources.



CONSERVATION

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Stewardship Alliance for Conservation Agriculture (SACA)

Enhancing Stewardship and Conservation within Agriculture

The Stewardship Alliance for Conservation Agriculture (SACA) is a partnership between WCFA, Yellowhead County and Woodlands County. This partnership has been in place since 2012, following a restructuring of the previous group known as the West-Central Conservation Group (WCCG). The WCCG had been a conservation partnership between five municipalities and WCFA.

Through this strategic partnership, our goal is to assist the agricultural community to find practical, environmentally sustainable practices and raise awareness through workshops, information sessions, demonstrations and projects.

It is through this partnership we are able to deliver programming to support local producers in achieving their stewardship goals. Programming under this partnership includes delivery of the Environmental Farm Plan (EFP) program, support with funding applications to programs such as the Environmental Stewardship and Climate Change program from the Canadian Agricultural Partnership (CAP), the Canada thistle biological control agent program, and delivery of Pond Days and Classroom Agriculture presentations to local schools. The SACA partnership also allows for projects to be developed in response to needs identified by the local communities, such as the Shiningbank Lake Community Stewardship Initiative, which wrapped up in 2019. Past projects have included work near Chip Lake, Paddle River and the Lobstick.

To connect with the Stewardship Alliance for Conservation Agriculture please contact the Conservation Agriculture and Extension Program Coordinator at WCFA.

Conservation Agriculture and Extension Program Coordinator, Jessica Watson

conservationag@westcentralforage.com

780-621-8670

SACA
Stewardship Alliance for Conservation Agriculture

West-Central Forage Association

Woodlands County

Yellowhead County

Alberta Soil Health Benchmark Monitoring Project

2019 Status Report

J. Watson , WCFA

Introduction

Background

The status and functionality of a soil should be measured not only by its chemical (fertility) properties but also for its physical and biological properties. Chemical components of soil have been intensively evaluated by commercial soil testing labs in Canada. Chemical fertility recommendations have been based on this knowledge. The role of soil biology, however, is not well understood and physical characteristics have not been monitored. Evaluation of biological soil characteristics has only become available during the past few years in laboratories in the United States and more recently eastern Canada. The existing biological labs do not base analysis and recommendations on parameters specifically related to Alberta soils. Chinook Applied Research Association's (CARA) Soil Health Lab, under the direction of Dr. Yamily Zavala, provides a unique service in evaluating soil health constraint indicators. A biological and physical baseline developed within the province will provide a framework which can help define strategies for managing and improving the productive capacity, and sustainability, of our soils (Dianne Westerlund, CARA).

Project Summary

Understanding soil health will give Alberta producers a valuable tool for use in making strategic management decisions on their farms and ranches. Sustainable productivity of a soil is a function of physical, chemical and biological soil functions. While chemical (mineral) characteristics are well documented through traditional soil testing, physical and biological components are not. This project is working to assess and document soil health indicators at over 200 locations per year across Alberta. Information from soil samples collected for various other projects, individual farmer submissions to CARA's Soil Health Lab, and samples collected by a number of applied research and forage associations across the province will be included in the benchmark inventory being created. This will result in a base of information from points all across the province which will serve as a new tool for our agricultural industry. The benchmarks will enable producers to evaluate their management practices with respect to soil health (Dianne Westerlund, CARA).

20 sites per year from 2018-2020 will be sampled by each participating organization, including WCFA. Sites will be re-visited three years following the initial benchmark sampling to monitor the impact of management activities.

Materials and Methods

No specific land use criteria was outlined, and as such site selection was made using only the 'criteria' of an interested landowner with a knowledge of the history and management of the site. WCFA's sites included annual crop production, annual forage production, and perennial forage production.

Data Collection

The CARA Soil Health Sampling protocol, developed by Dr. Zavala, was used for all sites.

Site Selection

An area approximately 30m by 30m was selected at each of the sampling sites. All efforts were made to select an area which was representative of or similar to most of the field unit. From within this area 8 sites were selected at random for core samples. The GPS coordinates for each core site were recorded to allow for future sampling of the same area.

Compaction Readings

10-12 compaction readings were taken at random locations within the sampling area. Compaction depth to 300 PSI was measured using a penetrometer. If the average depth to 300 PSI was 6 inches or less, core samples were taken in 0-3” and 3-6” increments. If the average depth to 300 PSI was greater than 6 inches then the core samples were taken from 0-6”. It is recommended that measurements should be taken when the soil moisture condition is not in the extreme (too wet or too dry). Efforts were made to follow this recommendation.

Compaction readings were then taken at each of the 8 core sites selected within the sampling area at both 200 and 300 PSI and these measurements were recorded. These measurements are used to assess the rooting depth affected by compaction and relate them to soil food web microbial habitat.

Figure 1. Soil Compaction Meter: Penetrometer. Image from CARA Soil Health Sampling Protocol.

Collection of Soil Samples

8 cores per sampling area were taken, in either 0-3” + 3-6” increments or from 0-6” as determined using the compaction reading procedure outlined above.

Figure 2. 2 inch diameter rings used for core sampling at 3 inch depth and 6 inch depth. Image from CARA Soil Health Sampling Protocol.

The appropriate 2 inch sleeve (0-3”+ 3-6” or 0-6” depth) was driven into the ground using a rubber mallet after crop residue or debris had been removed from the soil surface. Corresponding cores from all 8 core sites were combined into a composite sample (i.e. all 8 of the 0-3” cores were combined into one sample). A minimum of four cups of the composite samples was placed in a labeled and sealed plastic bag and kept cool until they could be shipped to the lab for analysis.

A minimum of two bulk density samples were collected at each site. These were collected using the 2” diameter sleeve at the 0-3” depth. Care was taken to ensure all soil from the sample cores was placed into a labeled and sealed plastic bag and sent to the lab for analysis.

Infiltration Procedure

A minimum of two infiltration measurements were taken within the sampling area (at the same site as the bulk density was collected; most often at core sites 2 and 4). Residue and/or vegetation was removed from the soil surface and a 4” diameter ring was inserted at least 2” deep into the soil. Care was taken to not disturb the soil surface contained within the ring. Plastic wrap was placed inside the ring to hold water. 206 ml (representing 1 inch) of water was poured into the ring. The plastic wrap was gently removed and a timer was used to record the time (in minutes) it took for the inch of water to infiltrate the soil. The timer was stopped when the soil surface started to glisten (Figure 3).

Figure 3. Soil Infiltration test. L-R: ring placed 2” into soil, plastic wrap inside the ring, glistening soil surface--timer stopped at this point. Images from CARA Soil Health Sampling Protocol.

If infiltration time was less than ten seconds, a repeat infiltration test was conducted without moving the ring (i.e. time was recorded for a second inch of water to infiltrate the soil). Timing of infiltration was stopped after 30 mins and simply recorded as greater than 30 mins if this occurred.

Saturated soils do not allow for infiltration to occur. The recommendation is to wait 2-3 days following a rain event to allow for some drying of the soil before performing infiltration tests. Efforts were made to follow this recommendation whenever possible.

Lab Analysis

All samples were kept cool until they were shipped to CARA’s Soil Health Lab in Oyen, AB for analysis. The CARA Soil Health Lab looked at a number parameters for each sample including: wet aggregation stability, compaction, bulk density, texture, active carbon, C:N ratio, soil microbial respiration, active & total bacteria & fungi, nematode & protozoa functional groups, organic matter, pH, EC, etc., N, P, K and micro nutrients.

Results and Discussion

Sampling was originally intended to begin in the fall of 2018, but due to the late approval of the funding for the project, WCFA did not sample any sites in 2018. The plan was to sample the 20 sites that had been intended for the fall of 2018 in the spring of 2019 and the 20 sites for 2019 in the late summer of 2019. Due to the excessively wet conditions, spring sampling did not occur in 2019 and the majority of the sites that were sampled were completed in August (note: 2 sites were completed in June 2019).

A total of 16 sites were sampled in 2019, however, one set of samples did not reach the lab. Results were obtained for only 15 sites. The missing site will be re-sampled/made-up for in 2020, along with the remainder of the sites that did not get sampled due to the weather conditions. The sampling program for 2020 will aim to make-up for the sites missed in 2018/2019 and include the 20 new sites to be sampled in that year (i.e. 45 sites to be done in 2020). The sites completed in 2019 will be re-visited in 2022 (3 years following their initial sampling) to determine if management has had any effect on the parameters analyzed.

Results for each of the 15 sites were reported individually. The attached report was received from the CARA Soil Health Lab for WCFA's Wildwood Research Site (WCFA-1). Each participating producer received a similar report for their site(s). A webinar will be scheduled in 2020 for producers to learn more about how to interpret and utilize the results of these reports in decision making. All results from this project will be added to the Soil Health Benchmark database by CARA's Soil Health Lab.

References

CARA's Soil Health Sampling Protocol Guidelines. Yamily Zavala, Ph. D. (Can be accessed at www.carasoilhealthlab.ca)

Report of Analysis from CARA Soil Health Lab

Submission N / Land Location	Farmer Id No.	Sample No.	Depth (cm)
SE 27-53-09-W5	WCFA-1	464	0-15

% Sand	% Silt	% Clay	Textural Class:	
26	54	20	Medium	Silt loam

Soil Health Analysis: Biophysical & Others

		Results	Score	
	Indicator	464	464	Constraint(s)
Physical	Wet Aggregate Stability (%)	72	99	
	Water Infiltration (min)	16	97	
	Bulk Density (g/cm3)	0.80	100	
	Compaction Depth/cm (200psi)	64	100	
	Compaction Depth/cm (300psi)	76	100	
	Mean Physical Health:		99	99
Biological	Organic Matter (%)	5	96	
	Active Carbon (ppm)	295	13	Water infiltration, microbial biomass growth and activity, nutrient cycling, carbon storage, aggregate stability, bulk density, nutrient availability, supply of labile carbon
	C:N Ratio	12	98	
	Microbial Respiration (mg CO_2/g)	0.60	50	
	Mean Biological Health:		64	64
Chemical	pH	6.1	83	
	Soluble Salts (EC)	0.28	93	
	Extractable P (ppm)	29	0	P Deficiency
	Extractable K (ppm)	339	0	K High
	Magnesium (ppm)	620	0	Mg High
	Iron (ppm)	113	0	Excessive Fe
	Manganese (ppm)	22	1	
	Zinc (ppm)	13.2	0	Zn High
	Other nutrient Rating (0-4)		1	1
	Mean Chemical Health:		36	36
Overall Soil Health Score:			66	Medium

Add-On Tests

Physical and Biological Indicator Scores are calculated using the cumulative normal distribution function for Coarse, Medium, and Fine textural classes. Depending on the measured soil texture distribution, this worksheet identifies the appropriate soil textural class and uses the corresponding Scoring Function. Each Indicator Score represents the percentage of all samples scoring at or below the measured value when compared across the complete sample database. Chemical Indicator Scores are not based upon the normal distribution. Soil pH, Extractable P, and Extractable K are scored as follows: a) pH Score of 100 for pH 6.25-7.25, Score of 0 for pH >= 7.7 and <=5.4, b) P Scores were base on 25 + 5 ppm optimun P levels c) K Score of 100 for >=74.5 ppm, Score of 0 for <= 20 or 200 ppm. Other Nutrients Rating are determined on a scale of 0-4, representing the sum of Scores for Mg, Fe, Mn, and Zn and follows: a) Mg Score of 1 for > 33 ppm, 0 for <= 33 ppm, and 0 for > 200ppm, b) Fe Score of 1 for < 25 ppm, 0 for >= 25 ppm, c) Mn Score of 1 for < 50 ppm, 0 for >= 50 ppm, d) Zn Score of 1 for > 3ppm, 0 for <= 3 ppm and 0 for > 10ppm. Indicator Scores are assigned a color grade using the follows system: Very High, Score of 80-100 (Blue), High, Score of 60-80 (Green), Medium, Score of 40-60 (Yellow), Low, Score of 20-40 (Orange), Very Low, Score of 0-20 (Red). For Other Nutrients Ratings, a Score of 1 is best (blue) and 0 is worst (red). The Other Nutrients Rating is then converted to a 1-100 scale as follows (4, 100), (3, 56), (2, 11), (1, 4), and (0, 0). The Mean Physical, Biological, and Chemical Health Scores are calculated as the average of the Indicator Scores within each category. The average of the Mean Physical, Biological, and Chemical Health Scores is the Overall Soil Health Score. The Overall Soil Health Score is categorized using the following scale: Very High, >= 85; High, >= 70; Medium, >= 55; Low, >=40; Very Low, < 40.

Report Number: C19189-10002
Account Number: 01207

To: CHINOOK APPLIED RESEARCH ASSOC
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OYEN, AB T0J 2J0

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, Ontario, N5V 3P5
Telephone: (519) 457-2575 Fax: (519) 457-2664

C19189-10002

For: CARA SHL SN1-002104

Grower Code: 1-002104

Reported Date:2019-07-10 **Printed Date:**Jul 11, 2019

SOIL TEST REPORT

Sample Number	Legal Land Descpt:	Depth	Lab Number	Organic Matter	Phosphorus - P ppm Bicarb	Phosphorus - P ppm Bray-P1	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	pH	Buffer	CEC meq/100g	Percent Base Saturations % K	% Mg	% Ca	% H	% Na
464	WCFA-1	0	46054	5.0	20 M	29 M	339 VH	620 H	3010 L	6.1	6.4	28.4	3.1	18.2	53.1	25.1	0.5
465	WCFA-2	0	46055	5.0	11 M	15 L	277 H	832 H	3280 L	5.8	6.3	32.6	2.2	21.3	50.3	25.5	0.7

Sample Number	Sulfur S ppm	Sulfur S lbs/ac	Nitrate Nitrogen NO3-N ppm	Nitrate Nitrogen NO3-N lbs/ac	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Soluble Salts mmhos/cm	Saturation %P	Aluminum Al ppm	Saturation %Al	K/Mg Ratio	ENR	Chloride Cl ppm	Sodium Na ppm
464	8	VL	9	L	13.2 VH	22 M	113 VH	11.8 VH	0.3 VL	0.3 VL	4 M	883	0.2 G	0.17	63	8	34 L
465	8	VL	1	VL	8.4 H	15 M	121 VH	10.9 VH	0.3 VL	0.2 VL	2 L	835	0.3 G	0.10	63	8	55 M

W VL = VERY LOW, L = LOW, M = MEDIUM, H = HIGH, VH = VERY HIGH, G = GOOD, MA = MARGINAL, MT = MODERATE PHYTO-TOXIC, T = PHYTO-TOXIC, ST = SEVERE PHYTO-TOXIC

SOIL FERTILITY GUIDELINES (lbs/ac)

Sample Number	Previous Crop	Intended Crop	Yield Goal	Lime Tons/Acre	N	P2O5	K2O	Mg	Ca	S	Zn	Mn	Fe	Cu	B
464		Grass-Leg. Hay 25/7	mt/ha	5.5	20	65	200	0	0	40	0.0	0	0	0	2.0
465		Grass - Hay	6 tons	5.5	165	135	60	0	0	50	0.0	1	0	0	2.0

C19189-10002

CARASHLab
Highway 41E,
Oyen, Alberta T0J 2J0 Canada
Phone: (403) 664 3777
Fax: (403) 664 3000
e-mail: carashl@telus.net

Soil Foodweb Analysis
West Central Forage Association
Rachel Nay
Box 360
Evansburg, Alberta T0E0T0
Fax:
conservationag@westcentralforage.com
Plants: Not Indicated
Sample Received: 6/24/2019

Lab Submission #: 1-002104

Organism Biomass Data Invoice Numbe: 1-002104

Sample #	Unique ID	Depth Inches	Active Bacterial Biomass (µg/g)	Total Bacterial Biomass (µg/g)	Active Fungal Biomass (µg/g)	Total Fungal Biomass (µg/g)	Average Hyphal Diameter (µm)	Protozoa Numbers/g Flagellates	Protozoa Numbers/g Amoebae	Protozoa Numbers/g Ciliates	Total Nematode (Dry Weight) #/g
464	WCFA 1	0-6	32	2,914	4	1,269	4.9	1,745	1,745	17,451	7.2
465	WCFA 2	0-6	29	2,766	9	524	3.5	5,831	5,831	539	2.1
Desired Range Pasture			10 - 25	150 - 300	10 - 25	150 - 300	(A)	10000 +	10000 +	50 - 100	20 - 30
Desired Range Annual crops			1 - 5	175 - 300	1 - 5	175 - 300	(A)	5000 +	5000 +	50 - 100	10 - 20

(A) Hyphal diameter of 2.0 indicates mostly actinobacteria hyphae, 2.5 indicates community is mainly ascomycete, typical soil fungi for grasslands, diameters of 3.0 or higher indicate community is dominated by highly beneficial fungi, a Basidiomycete community.

Organism Ratios

Sample #	Unique ID	Depth Inches	Total Fungal To Total Bacterial Biomass	Active to Total Fungal Biomass	Active to Total Bacterial Biomass	Active Fungal to Active Bacterial Biomass	Nematode Feeding Habit Identified #/g (Wet Soil) BactF	FungF	RootF	Pred
464	WCFA 1	0-6	0.436	0.003	0.011	0.111	2.79	0.19	2.79	0.00
465	WCFA 2	0-6	0.189	0.018	0.011	0.324	0.43	0.36	0.89	0.00
Desired Range			*(1)	*(2)	*(2)	*(3)			*(4)	

(1) Brassica: 0.2-0.5; Row crops: 0.6 to 1.2; Early successional grass: 0.5-0.75; Late successional grass: 0.8 to 1.5; Berries, shrubs, vines: 2-5; Deciduous Trees: 5-10; Conifer: 10-100.
(2) Warm spring, early summer: 0.25 to 0.95; Early spring, late winter & mid-summer: 0.10 to 0.15; Fall rain: 0.15 to 0.20; Drought/frozen soil/heavy metal/many pesticides: 0.05 or lower. Values greater than indicated mean the organisms are recovering from a negative impact. Values lower mean organisms are not recovering and help is needed, typically addition of their food resource is required.
(3) Generally 1:1 results in good soil aggregate structure in crop soil; 2 to 5 for deciduous trees; 5 for conifers. Values above 1:1 mean negative impact. Values lower mean organisms are not recovering and help is needed, typically addition of their food resource is required.
(4) Identification of Todes feeding groups: (BactF) Bacteria, (FungF) Fungal, (Pred) Predatory, (RootF) Plant/Root,

Season, moisture, soil and organic matter must be considered in determining optimal foodweb structure.
All submissions receive free 15 minute consultation, call +1 403 664 3777

Notes: Protozoa numbers and types are an estimate of their appearance when counting them base on shapes, movements, sizes, colors, etc

Sample	Protozoa Types Numbers (At Least) Flagellates	Ciliates	Amoeba	Fungal Hyphae Colors*	Diam (um)	Other Comments
464	5	2	2	C,	2.3-6.3	Large Ciliates, Bacteria diversity, rotifers, 3different types of stalked ciliates (vorticella-like), Lots aphelenchus (Rfeeder)
465	6	2	2	C, T	2.3-8.3	

* C:Clear, B Brown, LB: Light Brown, DB: Dark Brown, Burg:Burgandy, T:Tan

Shining bank lake community stewardship initiative

2019 Final Report

J. Watson, SACA

West-Central Forage Association wishes to acknowledge the financial assistance of Land Stewardship Centre's Watershed Stewardship Grant Program, funded by Alberta Environment and Parks, for making this project possible.

Background

In 2017, the Stewardship Alliance for Conservation Agriculture (SACA) launched the Shiningbank Lake Community Stewardship Initiative amid concerns from the community and lake users about the health of the lake (primarily water quality). Support for the project was provided by the Land Stewardship Centre through their Watershed Stewardship Grant (WSG).

Since the beginning, this initiative has aimed to bring awareness to the local community and recreational users of the lake and surrounding area on topics including riparian health, biodiversity, wildlife habitat, water quality, and additional watershed and aquatic ecosystem health topics.

Project Summary

The first phase of the project began in 2017 and consisted primarily of data collection in an effort to benchmark health parameters near Shiningbank Lake. Riparian health assessments and inventories were conducted at various locations along the lake. Some were done internally by SACA staff, with more detailed inventories completed by Cows and Fish. Overall most sites scored as healthy.

Water quality sampling was conducted in late 2017 and during high use periods in 2018. A number of parameters were analyzed at Exova Labs in Edmonton, AB including turbidity, water chemistry parameters, dissolved metals, micro-biologicals, and phosphorous, among others.

The Alberta Lake Management Society (ALMS) sampled Shiningbank Lake as part of their LakeWatch program in 2016. LakeWatch is a volunteer-based water quality monitoring program offered to Albertans who are interested in collecting information about their local lake or reservoir. ALMS technicians assist volunteers to test the lakes 5 times during the summer, collecting important data such as water temperature, clarity, a suite of water chemistry parameters, and invasive species. The water quality reports received by SACA were submitted to ALMS to compare to their LakeWatch results.

A Lake Health day was hosted at the lake in August, 2018. This event allowed lake users and community members to engage with a variety of organizations and provided an opportunity for further education and discussion around a number of topics related to overall lake, aquatic ecosystem and watershed health.

Additional funding was secured through the WSG for the project to continue in 2019. This second phase was focused primarily on extension and community engagement activities.

A short series of educational videos were filmed with the Yellowhead County Communications Department and SACA staff. The three videos covered invasive species, riparian zones and algal blooms. The videos are in the editing phase and will be distributed through our website and social media channels as soon as they are available.

These short videos were intended to provide information on the topics in small segments to allow for expanded reach to the community and beyond. It has been shown that attention spans are quite limited when watching videos, and the aim was to provide some information on the topics within a short time span (maximum three minutes) and encourage those watching the videos to seek out more information on these topics.

A second Lake Health day was hosted in August, 2019, once again allowing for lake users and community members to engage with a variety organizations and further educate themselves on lake and aquatic health. The Agroforestry and Woodlot Extension Society of Alberta (AWES), ALMS, Alberta Environment and Parks, WCFA, Alberta Fish and Wildlife and Cows and Fish all participated in this event.

An open-house event was planned as a wrap-up to the project. The intent was to discuss the project and some of the learnings as well as provide some more information about riparian and water quality topics. Both ALMS and Cows and Fish were set to do presentation on these topics, with as much focus as possible on Shiningbank Lake. Unfortunately, due to a lack of interest from the community, the event did not move forward.

The Shiningbank Lake Community Stewardship Initiative was completed in early 2020. There are no further activities planned for this initiative, but this may be re-visited in the future.

Canada thistle biological control program

2019 Report

Background

Each year WCFA/SACA works with a large number of individuals throughout the province to tackle Canada thistle infestations through the use of biological controls.

Canada thistle is listed as 'noxious' on Alberta's weed control act, meaning it must be controlled. The use of biological control agents to do so has become increasingly popular in recent years. Interest in our program has continued to grow, often putting a strain on our suppliers to meet the high demands.

We currently facilitate the importation and delivery of two biological control agents for Canada thistle: stem-mining weevils and stem-gall flies.

Why Biocontrol?

It is a method of control that is specific to the target plant, i.e. Canada thistle, and will not move to economically important crops (pasture, etc.). It has the ability to infest plants in inaccessible areas. Once established the agents are self-perpetuating, and have the potential to migrate to other locations (thistle patches). Once established it is also a very cost-effective method that is often less expensive and labour intensive than chemical or mechanical methods of control. The goal of Canada thistle biocontrol is to reduce plant vigor and it's dominance in the landscape. It is not to completely eradicate the thistle, as it is very unlikely that the use of biocontrol agents alone will be able to achieve this.

Stem-Mining Weevils

The Canada thistle stem-mining weevil (*Hadroplontus litura*) occurs naturally in France, Switzerland, Austria, Germany, Britain, and southern Scandinavia. It was first introduced into Canada as a biological pest control agent in 1965 and into the US in the early 1970s. WCFA has been importing these agents from Montana for producers for over ten years.

Adult stem-mining weevil (Hadroplontus litura)

Stem-mining weevils are intended to act as a permanent, self-perpetuating control mechanism for Canada thistle. These insects restrict their feeding to Canada thistle only.

How do they work?

Eggs are laid in the mid-vein of the rosette leaves in early spring, and hatch after five to nine days. Larvae internally mine the inside of the stem of the thistle plant as the shoot elongates during the summer. Fully developed larvae will exit the plant at the root and enter the soil to pupate. They will emerge again in their adult form later in the summer, and feed on thistle leaves before winter. Adults will over winter in the soil, ready to attack the emerging thistle the following spring.

When the larvae mine the stem, they consume plant tissue, and leave exit holes when they emerge, which may allow other micro-organisms to enter the thistle stem, with adverse consequences for the thistle.

Weevil larvae in thistle stem

2019 Weevil Program

Orders accepted were capped at 200 releases for 2019. This was in response to issues faced in recent years with supplying enough to meet increased demand. The 200 release maximum was quickly reached and many individuals were added to a wait list.

Unfortunately, our suppliers ran into some difficulty with collection of the weevils, and we were unable to fill all of the 2019 orders. We received 88 releases (out of the 200) and these were distributed based on when payment was received for the order. The unfilled orders were refunded in full.

Stem-Gall Flies

The Canada thistle stem-gall fly (*Urophora cardui*) is native to Europe, but has been used in Canada for control of Canada thistle since around the 1970s. WCFA has been importing these agents from Montana for producers since 2017.

Adult gall-fly (Urohpora cardui)

How do they work?

The stem-gall fly attacks the stem of the thistle plant, boring in and causing the plant to form gall tissue. Females lay their eggs on the apical meristem (tip) of developing shoots in the early summer, and larvae burrow into the shoots. Larval feeding triggers gall formation, which stresses the plant. The gall becomes a nutrient sink, directing nutrients away from the plant's normal metabolic & reproductive functions, lowering normal plant function and reproduction. Abnormally developed flower heads frequently occur above the gall, resulting in fewer flowers and lowered seed production. Galls vary in size, depending on the number of larvae present within. Galls may range in size from small (marble) to large (walnut/plum), containing anywhere from three or four larvae to upwards of 25 larvae. The flies overwinter in the gall as mature larvae and emerge as adults in the spring (around June) when the gall tissue deteriorates.

This insect does best at moist sites but seems to establish in a wide variety of environmental conditions. It is not appropriate in areas where Canada thistle is flooded, heavily grazed, mowed, or sprayed. Strong grass competition in conjunction with good fly densities may reduce Canada thistle infestations.

2019 Gall Fly Program

334 releases were ordered in 2019 and all orders were successfully delivered throughout the province. The collection method for gall-flies is much more reliable and predictable than that of the weevils, and as such we have yet to have an issue meeting demand.

Notes about Biological Control

In the most successful examples of biological control there are always a small number of plants that do not fully succumb to the attack of the beneficial insect. This is good. It allows the insect population to sustain itself during years of low weed density. Once the weevils have exhausted a thistle patch, they will migrate to look for more food, for example.

Biological control insects alone are not the answer. Without healthy stands of desirable vegetation to take the place of undesirable weeds, bio-control cannot be successful. As the insects reduce the weed population, useful plants take their places and gain a competitive advantage. Together, bio-control agents and competing vegetation will reduce weed infestations. Encouraging desirable plants, by re-seeding or reducing grazing pressure, will greatly help the insects do their job.

Additional stewardship Programs Supported by SACA and WCFA

ALUS Partnership Advisory Committees

The ALUS program works with farmers to produce valuable ecological services on Canadian farmland. More specifically, ALUS helps farmers and ranchers restore wetlands, reforest, plant windbreaks, install riparian buffers, manage sustainable drainage systems, create pollinator habitat and establish other ecologically beneficial projects on their properties. What's more, ALUS provides per-acre annual payments to ALUS participants to recognize their dedication to managing and maintaining all the ALUS projects on their land.

As ALUS is a community driven program, each active ALUS community establishes a local Partnership Advisory Committee (PAC) to direct local programming. The PAC includes a broad spectrum of community members, such as representatives from local environmental groups, local government agencies and local industry. Approximately 50 percent of each PAC is made up of farmers.

WCFA has been a member of the ALUS Brazeau PAC since 2016 and will continue to support this program moving forward. Beginning in 2020 we will also be active members of the ALUS Parkland PAC. We are looking forward to working with the PAC members in both communities and continuing to support ALUS in our local area.

We would also like to note that although we are not members of their PACs, we work closely with and are strong supporters of the other ALUS programs in our area, which include ALUS Lac Ste. Anne and ALUS Leduc-Wetaskiwin.

If you are interested in the ALUS program we encourage you to contact your local ALUS coordinator.

ALUS Brazeau

Corbyn Pankonin

PH: 780-542-7777
CPankonin@brazeau.ab.ca

ALUS Lac Ste. Anne

Megan Casey

PH: 780-785-3411 x272
alus@lsac.ca

ALUS Parkland

Jennifer Caudron

PH: 780 968-8888 x8286
jennifer.caudron@parklandcounty.com

ALUS Leduc-Wetaskiwin

Kim Barkwell

PH: 780-770-9293
C: 780-387-6182
kimb@leduc-county.com

Alberta Environmental Farm Plan (EFP)

The Environmental Farm Plan (EFP) is a voluntary, whole farm, self-assessment tool that helps producers identify their environmental risks and develop plans to mitigate identified risks. Through this program we are able to assist producers in achieving their stewardship goals.

Our trained EFP Technicians are able to assist producers throughout the municipalities in our coverage area in completing their EFPs through one-on-one consultations or group workshops hosted in various locations throughout the year.

For more information on the EFP program contact Jessica at 780-621-8670 or conservationag@westcentralforage.com.

Canadian Roundtable for Sustainable Beef (CRSB)

The CRSB was established in 2014 by a community of stakeholders devoted to fostering continuous improvement and sustainable practices across the Canadian beef value chain.

Membership in the CRSB provides a forum for organizations and companies with an interest in sustainability an opportunity to share knowledge and collaborate on initiatives that advance the sustainability of the Canadian beef industry as well as the understanding of sustainable beef production in Canada.

The CRSB's objective is to promote sustainability throughout the Canadian beef industry through three pillars of focus:

1. Sustainability Benchmarking
2. A voluntary Certification Framework
3. Sustainability Projects

WCFA is proud to be a member of the CRSB. For the year 2019 we were active participants in the Certified Sustainable Beef Framework Committee, which oversees the delivery of CRSB's Certified Sustainable Beef Framework.

The Certified Sustainable Beef Framework is an operation-level certification program developed by the CRSB. Its standards serve as a checklist to recognize sustainable beef practices across the nation, to enable sustainable beef sourcing, and to build consumer confidence backed by credible, science-based claims.

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APPENDIX

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Environmental Data

Yellowhead (Evansburg)

The average growing season temperature for Evansburg was 12°C. Evansburg accumulated 434mm (17") of rain from May 1st to Sept 30th. July was the wettest month, and 2019/2012 were tied for the wettest year in the past decade. Evansburg accumulated 1,089 growing degree days (base 5°C) from May 1st to Sept 30th.

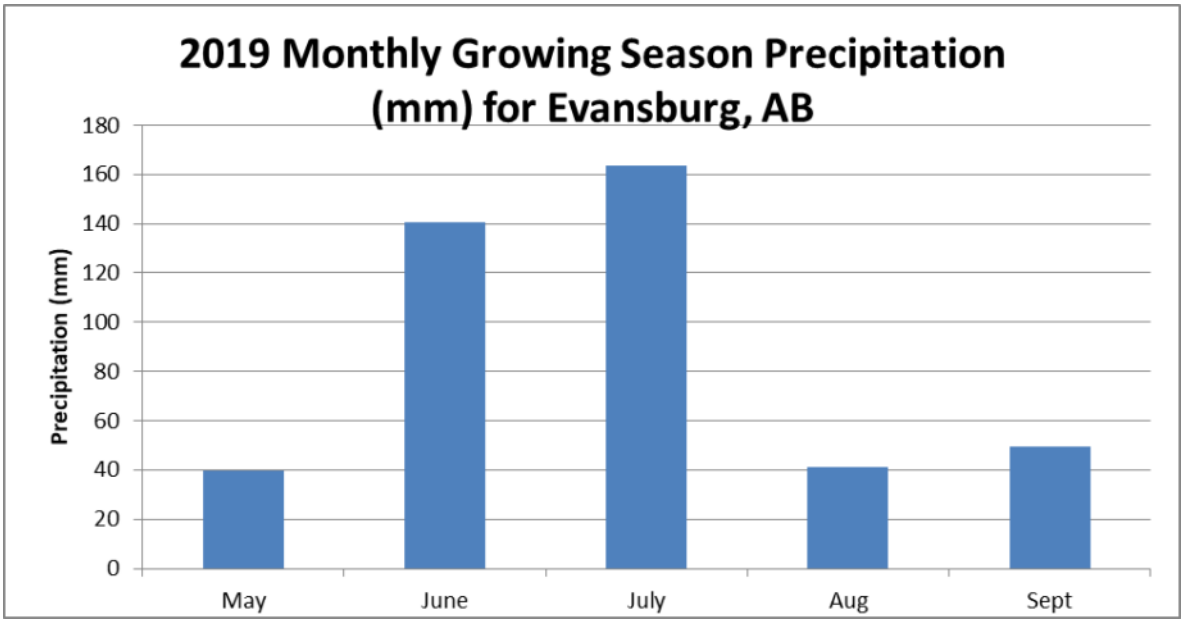

Figure 1. Monthly precipitation during the 2019 growing season for Evansburg, AB.

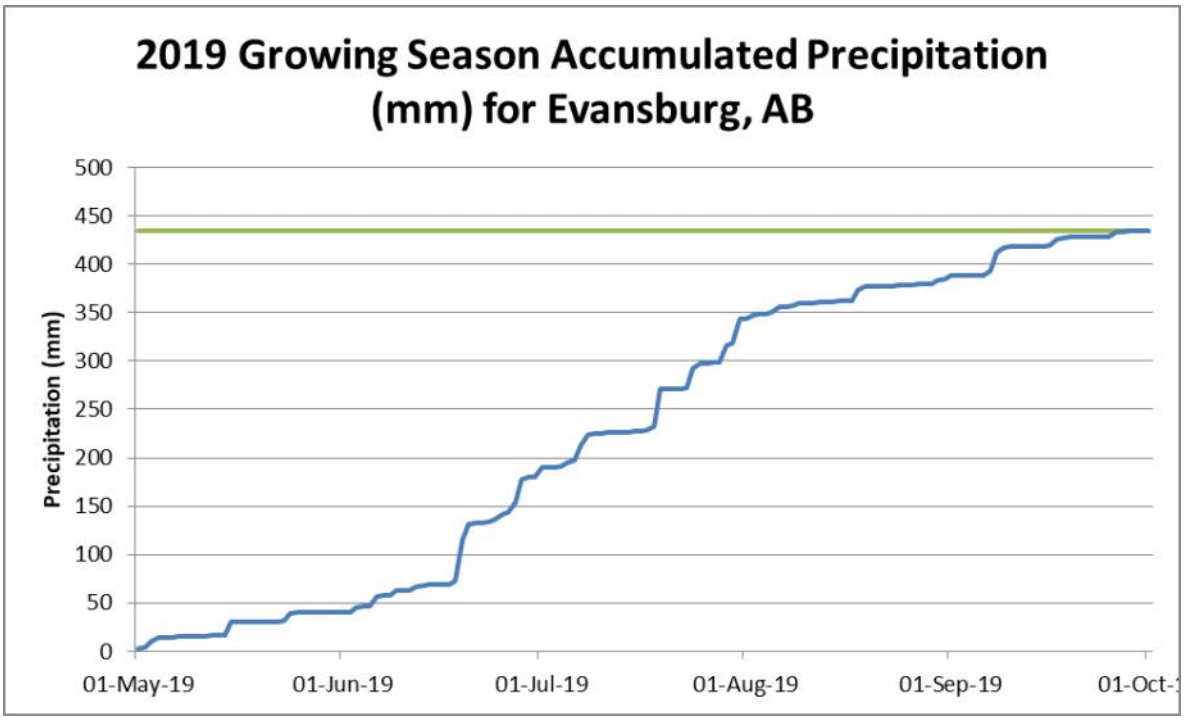

Figure 2. 2019 growing season accumulated precipitation (mm) for Evansburg, AB. The green line represents the total accumulated precipitation of 434mm (17").

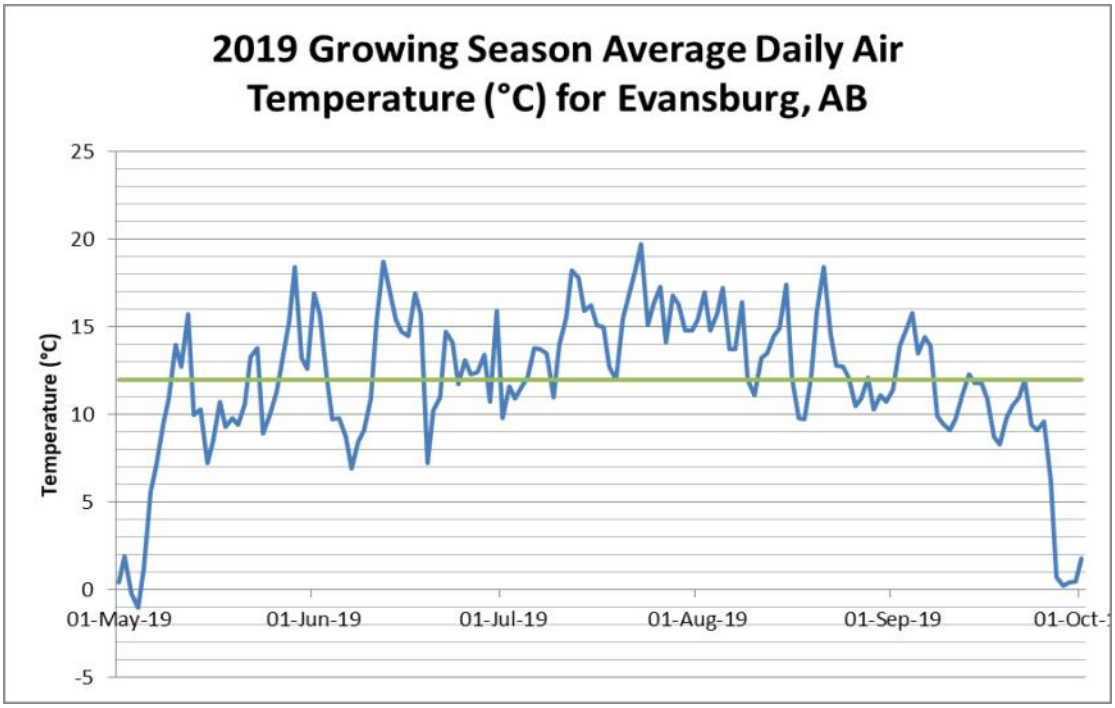

Figure 3. 2019 growing season average daily temperature (°C) for Evansburg, AB. The green line represents the growing season average of 12°C (54°F).

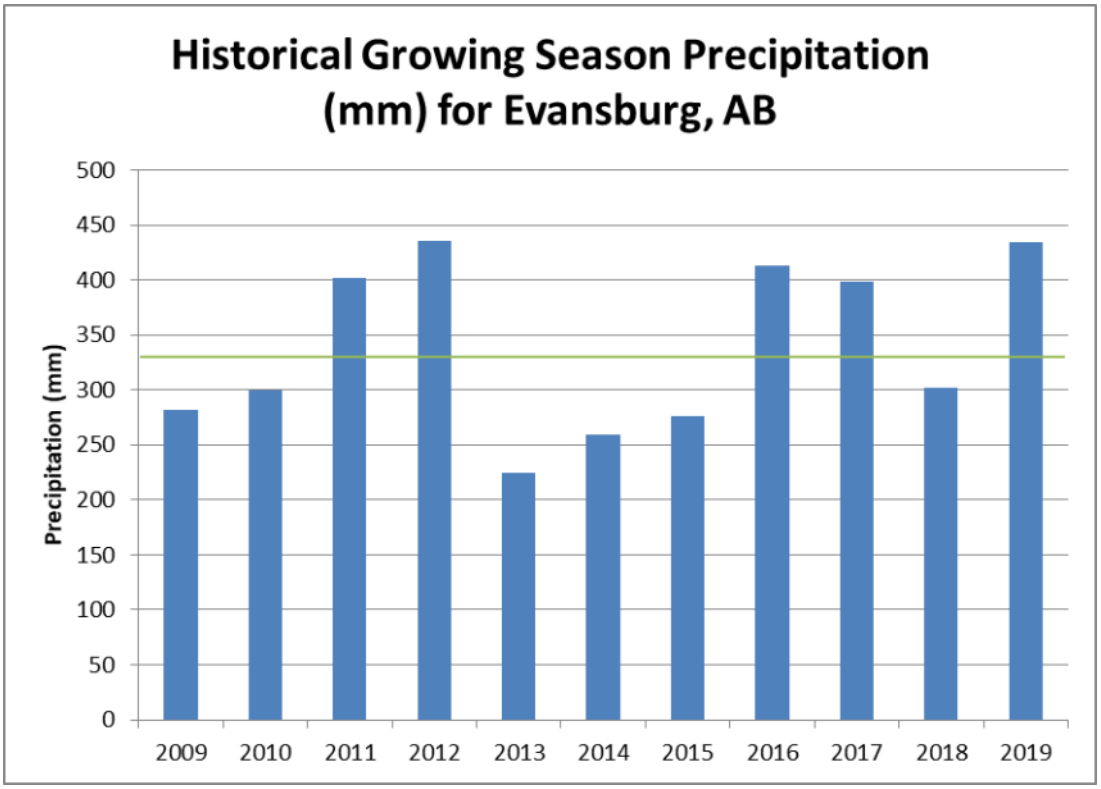

Figure 4. Historical growing season (May 1 to Sept 30) precipitation (mm). The green line represents the 2009 -2018 average of 330mm (13”).

Brazeau (Violet Grove)

The average growing season temperature for Brazeau was 12°C. Brazeau accumulated 413mm (16.3") of rain from May 1st to Sept 30th. June was the wettest month, and 2019 was the second-wettest year in the past decade. Brazeau accumulated 1,142 growing degree days (base 5°C) from May 1st to Sept 30th.

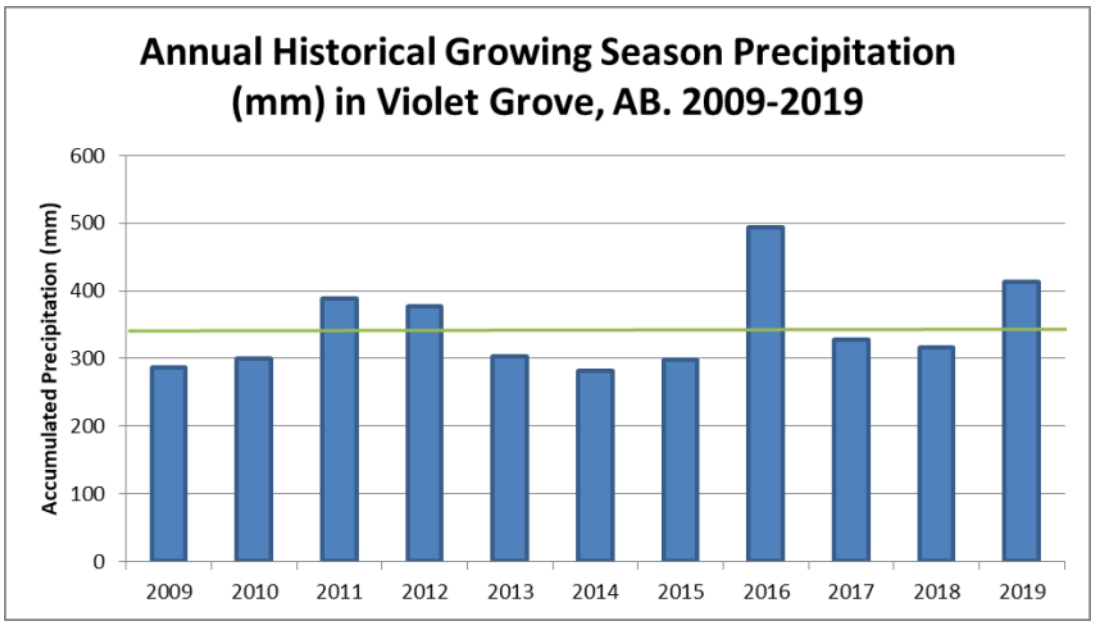

Figure 5. Annual growing season precipitation in Violet Grove, AB. from 2009 to 2019. The horizontal green line represents the ten-year average of 344mm (13.5”). Figure 8- Annual growing season precipitation in Violet Grove, AB. from 2009 to 2019. The horizontal green line represents the ten-year average of 344mm (13.5”).

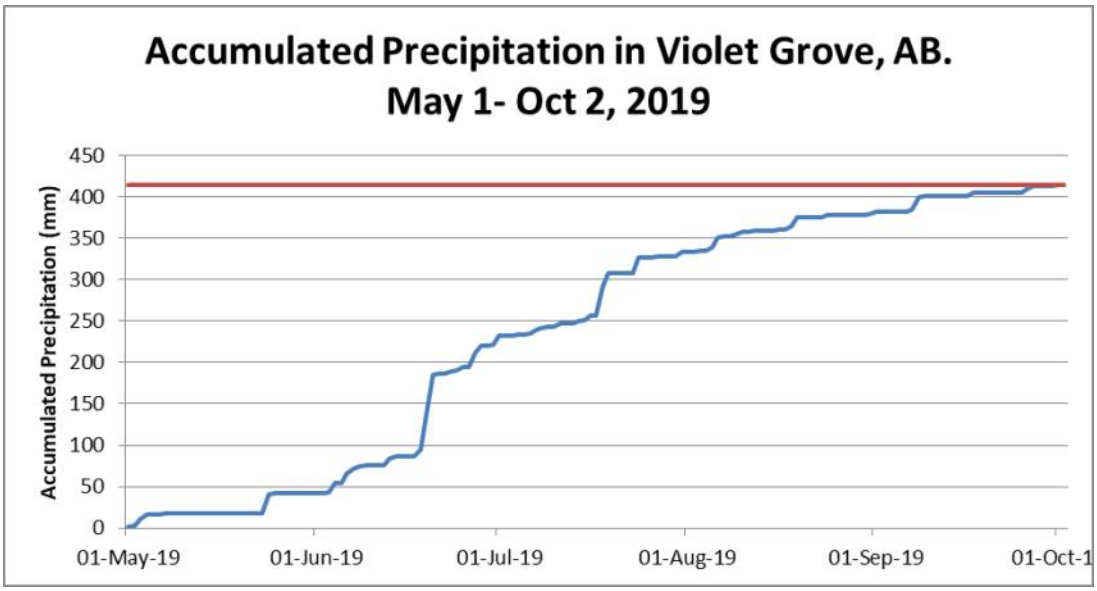

Figure 6. Accumulated Precipitation in Violet Grove, AB for the 2019 growing season. The red line represents the total precipitation accumulated, 413mm (16.3”).Figure 9- Accumulated Precipitation in Violet Grove, AB for the 2019 growing season. The red line represents the total precipitation accumulated, 413mm (16.3”)

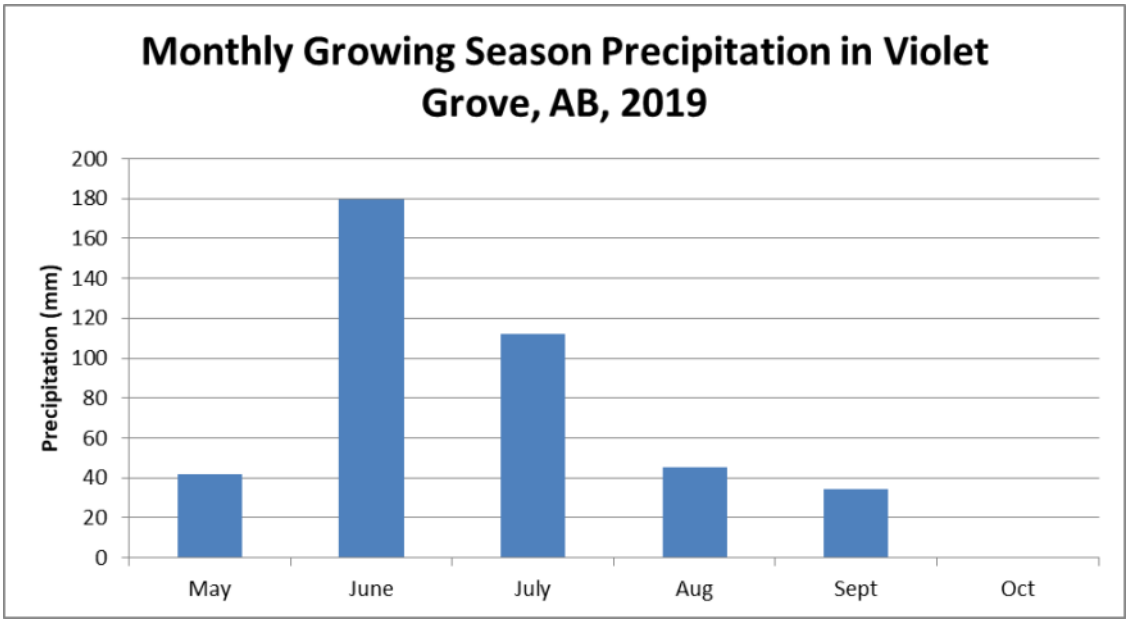

Figure 7. Monthly Growing Season Precipitation For Violet Grove, AB, 2019.

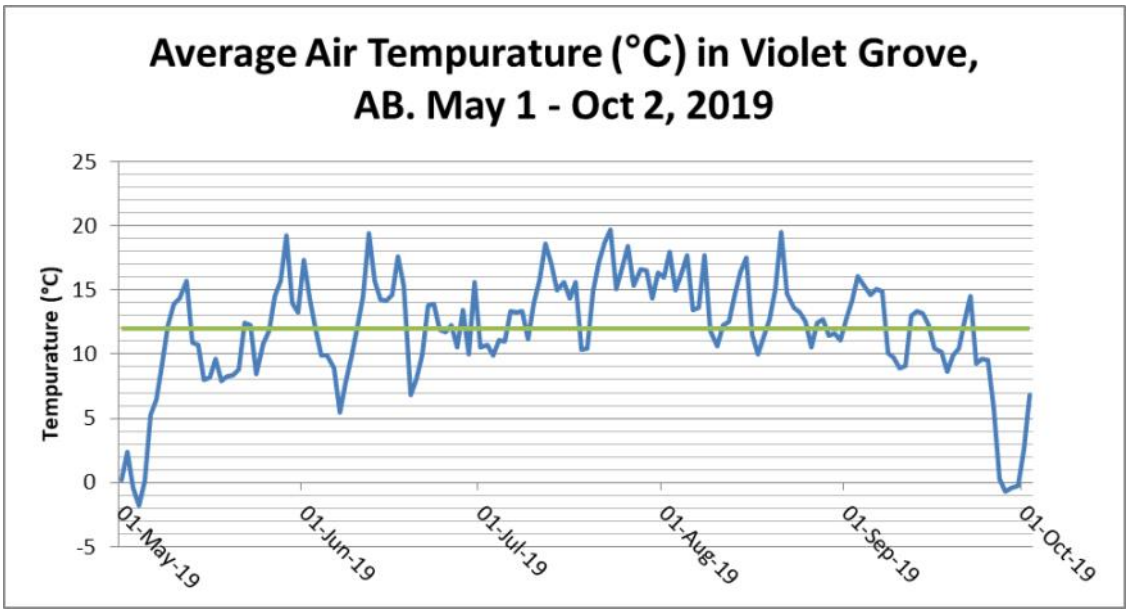

Figure 8. Average daily air temperature in Violet Grove, AV for the 2019 growing season. The green line represents the growing season average of 12 °C (54 °F).

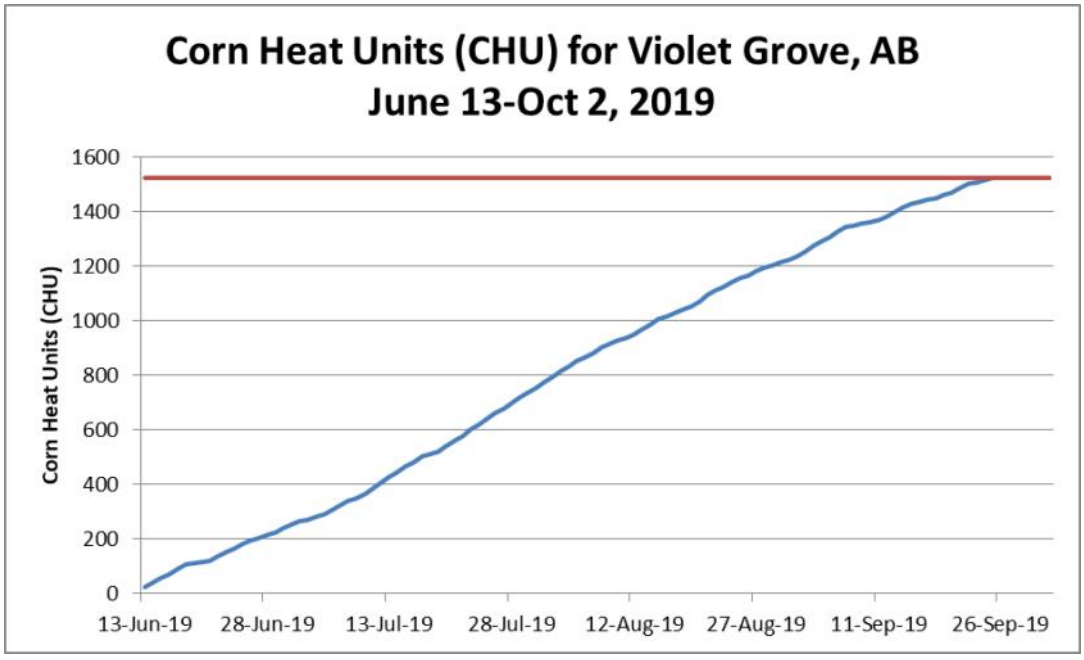

Figure 9. Corn Heat Units (CHU) for Violet Grove, AB from June 13-Oct 2, 2019. The red line represents the total CHU of 1,521.14.

Feed Analysis Reports: 2019 Corn Variety Trial

REPORT NO.
C19295-35074
ACCOUNT NUMBER
03086

A&L CANADA LABORATORIES INC.

2136 Jetstream Rd, London, ON, N5V 3P5 Tel (519) 457-2575 Fax: (519) 457-2664

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EVANSBURG, AB T0E 0T0
Phone:780-727-4447
Fax:780-727-4334

FOR:WCFA CORN VARIETY TRIAL 2019

CERTIFICATE OF ANALYSIS

PAGE: 1 / 6

LAB NUMBER:2956184
SAMPLE ID:LR 6073RR CORN
SAMPLE MATRIX:Corn Grain
SAMPLE CUT:
TEST CODE:FN1WM

DATE SAMPLED:2019-10-21
DATE RECEIVED:2019-10-22
DATE REPORTED:
DATE PRINTED:2019-10-24

PARAMETER	RESULTS AS FED	RESULTS DRY	UNIT	METHOD
DRY MATTER				
Moisture	6.28	0.00	%	AOAC 930.15
Dry Matter	93.72	100.00	%	Calculation
PROTEIN				
Crude Protein	11.68	12.46	%	NIR
Soluble Crude Protein	47.27	47.27	% of CP	NIR
ADF-CP	0.68	0.73	%	NIR
NDF-CP	1.81	1.93	%	NIR
UIP (Bypass Protein)	28.24	30.13	Est % CP	NIR
FIBRES				
Acid Detergent Fibre	31.11	33.19	%	NIR
Neutral Detergent Fibre	49.52	52.84	%	NIR
Lignin	2.76	2.94	%	NIR
ENERGY				
Total Digestible Nutrients (Weiss)	62.82	67.03	%	Calculation
NE Lactation	1.34	1.43	MCal/Kg	Calculation
Net Energy Lactation (Weiss)	1.42	1.52	MCal/Kg	Calculation
NE Gain	0.77	0.82	MCal/Kg	Calculation
Net Energy Gain (Weiss)	0.78	0.83	MCal/Kg	Calculation
NE Maintenance	1.44	1.54	MCal/Kg	Calculation
Net Energy Maintenance (Weiss)	1.32	1.41	MCal/Kg	Calculation
MINERALS				
Calcium	0.36	0.38	%	Wet Chemistry *
Chloride	0.35	0.37	%	NIR
Copper	5.47	5.84	ug/g	Wet Chemistry
Phosphorus	0.47	0.50	%	Wet Chemistry *
Potassium	3.37	3.60	%	Wet Chemistry
Sulphur	0.11	0.12	%	Wet Chemistry *
Magnesium	0.15	0.16	%	Wet Chemistry
Zinc	28.72	30.64	ug/g	Wet Chemistry *
Iron	81.30	86.75	ug/g	Wet Chemistry *
Manganese	22.01	23.48	ug/g	Wet Chemistry *
Sodium	0.02	0.02	%	Wet Chemistry
OTHER				
Starch	8.80	9.39	%	NIR
Total Ash	3.66	3.90	%	NIR
Crude Fat	0.98	1.05	%	NIR

* - accredited test
BDL - Not Detected

C19295-35074

The results of this report relate to the sample submitted and analyzed

Results Authorized By:
Ron Piett, Feed & Forages Specialist

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
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A&L CANADA LABORATORIES INC.

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Phone:780-727-4447
Fax:780-727-4334

FOR:WCFA CORN VARIETY TRIAL 2019

CERTIFICATE OF ANALYSIS

LAB NUMBER:2956184
SAMPLE ID:LR 6073RR CORN
SAMPLE MATRIX:Corn Grain
SAMPLE CUT:
TEST CODE:FN1WM

DATE SAMPLED:2019-10-21
DATE RECEIVED:2019-10-22
DATE REPORTED:
DATE PRINTED:2019-10-24

PARAMETER	RESULTS AS FED	RESULTS DRY	UNIT	METHOD
NFC	27.88	29.75	%	Calculation
Relative Feed Value	110.98	110.98		Calculation

* - accredited test
BDL - Not Detected

C19295-35074

The results of this report relate to the sample submitted and analyzed

Results Authorized By:
Ron Piett, Feed & Forages Specialist

REPORT NO.
C19295-35074
ACCOUNT NUMBER
03086

A&L CANADA LABORATORIES INC.

2136 Jetstream Rd, London, ON, N5V 3P5 Tel (519) 457-2575 Fax: (519) 457-2664

TO:WEST CENTRAL FORAGE ASSOC.
BOX 360
#1 5013 50 AVE
EVANSBURG, AB T0E 0T0
Phone:780-727-4447
Fax:780-727-4334

FOR:WCFA CORN VARIETY TRIAL 2019

CERTIFICATE OF ANALYSIS

PAGE: 3 / 6

LAB NUMBER:2956185
SAMPLE ID:NQ2507HTTT2
SAMPLE MATRIX:Corn Grain
SAMPLE CUT:
TEST CODE:FN1WM

DATE SAMPLED:2019-10-21
DATE RECEIVED:2019-10-22
DATE REPORTED:
DATE PRINTED:2019-10-24

PARAMETER	RESULTS AS FED	RESULTS DRY	UNIT	METHOD
DRY MATTER				
Moisture	9.98	0.00	%	AOAC 930.15
Dry Matter	90.02	100.00	%	Calculation
PROTEIN				
Crude Protein	10.96	12.18	%	NIR
Soluble Crude Protein	44.70	44.70	% of CP	NIR
ADF-CP	0.67	0.74	%	NIR
NDF-CP	1.67	1.86	%	NIR
UIP (Bypass Protein)	28.45	31.60	Est % CP	NIR
FIBRES				
Acid Detergent Fibre	31.26	34.73	%	NIR
Neutral Detergent Fibre	48.75	54.16	%	NIR
Lignin	2.57	2.86	%	NIR
ENERGY				
Total Digestible Nutrients (Weiss)	59.22	65.78	%	Calculation
NE Lactation	1.26	1.40	MCal/Kg	Calculation
Net Energy Lactation (Weiss)	1.34	1.49	MCal/Kg	Calculation
NE Gain	0.71	0.79	MCal/Kg	Calculation
Net Energy Gain (Weiss)	0.71	0.79	MCal/Kg	Calculation
NE Maintenance	1.36	1.51	MCal/Kg	Calculation
Net Energy Maintenance (Weiss)	1.23	1.37	MCal/Kg	Calculation
MINERALS				
Calcium	0.31	0.34	%	Wet Chemistry *
Chloride	0.32	0.35	%	NIR
Copper	5.31	5.90	ug/g	Wet Chemistry
Phosphorus	0.48	0.53	%	Wet Chemistry *
Potassium	2.93	3.26	%	Wet Chemistry
Sulphur	0.10	0.11	%	Wet Chemistry *
Magnesium	0.14	0.15	%	Wet Chemistry
Zinc	34.07	37.85	ug/g	Wet Chemistry *
Iron	68.60	76.20	ug/g	Wet Chemistry *
Manganese	22.77	25.29	ug/g	Wet Chemistry *
Sodium	0.02	0.02	%	Wet Chemistry
OTHER				
Starch	7.01	7.79	%	NIR
Total Ash	3.34	3.71	%	NIR
Crude Fat	0.74	0.82	%	NIR

* - accredited test
BDL - Not Detected

C19295-35074

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Ron Piett, Feed & Forages Specialist

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C19295-35074
ACCOUNT NUMBER
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FOR:WCFA CORN VARIETY TRIAL 2019

CERTIFICATE OF ANALYSIS

LAB NUMBER:2956185
SAMPLE ID:NQ2507HTTT2
SAMPLE MATRIX:Corn Grain
SAMPLE CUT:
TEST CODE:FN1WM

DATE SAMPLED:2019-10-21
DATE RECEIVED:2019-10-22
DATE REPORTED:
DATE PRINTED:2019-10-24

PARAMETER	RESULTS AS FED	RESULTS DRY	UNIT	METHOD
NFC	26.22	29.13	%	Calculation
Relative Feed Value	106.23	106.23		Calculation

* - accredited test
BDL - Not Detected

C19295-35074

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FOR:WCFA CORN VARIETY TRIAL 2019

CERTIFICATE OF ANALYSIS

LAB NUMBER:2956186
SAMPLE ID:LR 99577
SAMPLE MATRIX:Corn Grain
SAMPLE CUT:
TEST CODE:FN1WM

DATE SAMPLED:2019-10-21
DATE RECEIVED:2019-10-22
DATE REPORTED:
DATE PRINTED:2019-10-24

PARAMETER	RESULTS AS FED	RESULTS DRY	UNIT	METHOD
DRY MATTER				
Moisture	1.21	0.00	%	AOAC 930.15
Dry Matter	98.79	100.00	%	Calculation
PROTEIN				
Crude Protein	12.92	13.08	%	NIR
Soluble Crude Protein	38.11	38.11	% of CP	NIR
ADF-CP	0.72	0.73	%	NIR
NDF-CP	1.38	1.40	%	NIR
UIP (Bypass Protein)	34.94	35.37	Est % CP	NIR
FIBRES				
Acid Detergent Fibre	33.60	34.01	%	NIR
Neutral Detergent Fibre	53.11	53.76	%	NIR
Lignin	2.88	2.92	%	NIR
ENERGY				
Total Digestible Nutrients (Weiss)	64.72	65.51	%	Calculation
NE Lactation	1.39	1.41	MCal/Kg	Calculation
Net Energy Lactation (Weiss)	1.46	1.48	MCal/Kg	Calculation
NE Gain	0.79	0.80	MCal/Kg	Calculation
Net Energy Gain (Weiss)	0.80	0.81	MCal/Kg	Calculation
NE Maintenance	1.50	1.52	MCal/Kg	Calculation
Net Energy Maintenance (Weiss)	1.37	1.39	MCal/Kg	Calculation
MINERALS				
Calcium	0.37	0.37	%	Wet Chemistry *
Chloride	0.38	0.38	%	NIR
Copper	5.18	5.24	ug/g	Wet Chemistry
Phosphorus	0.40	0.40	%	Wet Chemistry *
Potassium	2.40	2.43	%	Wet Chemistry
Sulphur	0.13	0.13	%	Wet Chemistry *
Magnesium	0.17	0.17	%	Wet Chemistry
Zinc	34.67	35.09	ug/g	Wet Chemistry *
Iron	98.20	99.40	ug/g	Wet Chemistry *
Manganese	25.00	25.31	ug/g	Wet Chemistry *
Sodium	0.02	0.02	%	Wet Chemistry
OTHER				
Starch	9.10	9.21	%	NIR
Total Ash	3.12	3.16	%	NIR
Crude Fat	0.77	0.78	%	NIR

* - accredited test

BDL - Not Detected

C19295-35074

The results of this report relate to the sample submitted and analyzed

Results Authorized By:
Ron Piett, Feed & Forages Specialist

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CERTIFICATE OF ANALYSIS

LAB NUMBER:2956186
SAMPLE ID:LR 99577
SAMPLE MATRIX:Corn Grain
SAMPLE CUT:
TEST CODE:FN1WM

DATE SAMPLED:2019-10-21
DATE RECEIVED:2019-10-22
DATE REPORTED:
DATE PRINTED:2019-10-24

	RESULTS			
PARAMETER	AS FED	DRY	UNIT	METHOD
NFC	28.87	29.22	%	Calculation
Relative Feed Value	107.99	107.99		Calculation

* - accredited test
BDL - Not Detected

C19295-35074

The results of this report relate to the sample submitted and analyzed

Results Authorized By:
Ron Piett, Feed & Forages Specialist

Quantum Genetix Hair Collection Procedure

Before starting you will need:

- **A submission form, or equivalent to record animal information of samples collected**
- **An envelope or sealable bag for each sample to be collected**
- **Marker or pen**

Scissors to cut off excess/dirty hair

Procedure

1. Select 5-10 tail hairs near the base of the tail switch and quickly pull hairs upward (against the grain of the roots). Visually inspect to ensure that hooked or bulbous roots are attached. Repeat until 20-30 hairs with roots have been pulled.

2. Trim the ends opposite the roots to remove dirty, wet, excess hair.
   (Note: feces and urine in the hair can degrade the sample and make it unfit for DNA testing)

3. Place the hair sample in a paper envelope or sealable plastic bag. Use a separate envelope/bag for each sample. Clearly label the envelope/bag with the unique identity of the animal. Record the animal information on the submission form.
   Animal ID on envelope/bag must correspond to animal ID on the submission form.

4. Clean hands or put on a clean pair of surgical gloves collecting a sample from another animal. Repeat the above steps for each animal.

5. Place the envelope(s)/bag(s) along with the submission forms into an executive size envelope and mail or express post the envelope.

Quantum Genetix Ear Tissue Collection Procedure for Q•link, Q•select, Q•sort and other bovine DNA tests

Before starting you will need:

- **A submission form, or equivalent to record animal information of samples collected**
- **Quantum ear tissue collection tag and punch for each sample to be collected**
- **Quantum ear tissue collection tool**
- **Container to collect samples (bag, box)**

Freezer for sample storage

***IMPORTANT * Samples must be stored at subzero temperatures after collection to maintain integrity of DNA in the tissue.**

Procedure

1. Pull white collection tag from ring and place in the tool under the spring clip. The tail of the tag with the barcode and number should be oriented away from the tool.

a. Tag numbers in a ring are sequential starting with tag marked “1” and ending with tag marked “8”.

2. Record the collection tag number and corresponding Animal ID.

   Please ensure that the Quantum Tag correctly corresponds to the Animal ID (dangle tag, tattoo, RFID tag, etc.).

3. Place orange cutter over the pin on the tool.
4. Position the animal’s ear between the orange cutter and the spring clip. The cutter should go through the front of the ear. Squeeze the handles together, release, and remove tool from around the animal’s ear.
5. The orange cutter should be protruding from the white tag. Pull on the tail of the white collection tag to remove from the tool. Place the white collection tag in a container (plastic bag, box) for storage.

Repeat steps 1-5 for remaining animals.

Storage & Transport

1. Samples **must be frozen as soon as possible** and left frozen until as close to the shipping time as possible.

2. Ship samples with a freezer pack(s) and use the fastest shipping method possible. Ship samples in an insulated container (ex. Styrofoam) if possible.

Note: prolonged, non-refrigerated exposure may compromise DNA quality and inhibit test results.