## Regional Annual Silage Trials

**Partners:** Alberta Agriculture, Forestry and Rural Economic Development
Battle River Research Group
Chinook Applied Research Association
Gateway Research Organization
North Peace Applied Research Association
McKenzie Applied Research Association
West-Central Forage Association
SECAN
Association of Albert Co-op Seed Cleaning Plants
Alberta Brand, Canadian Seed Growers Association
A & L Canada Laboratories
Philip Amyotte
Canadian Agriculture Partnership

The Annual Forage Trial (AFTs) began at LARA in 2008 with the purpose of comparing annual forage crops for whole-plant production when considering both yield and quality. Funding was obtained from the Alberta Beef Producers and the Ag and Food Council. The trial was seeded in four blocks of plots (barley, oats, triticale and alternatives) in three locations (Fort Kent, St. Paul and Lac La Biche).

The trial was expanded in 2009 to form the Regional Silage Trials, a provincial partnership between six applied research and forage associations with 11 plot sites across the province. The Alberta Beef Producers provided funding for this initiative and Alberta Agriculture helped coordinate seed. While many of the associations involved have been growing silage trials for a number of years, this is the first coordinated effort to standardize the protocol, variety selection and data reporting. Provincial protocol was established for five blocks of plots: barley, oats, triticale, pulse and late-seeded.

In 2021, the LARA Regional Annual Silage Trial included six blocks: barley (18 varieties), oats (11 varieties), triticale and wheat (12 varieties), winter/spring intercrop (17 treatments), pulse (12 treatments) and alternative (10 varieties).

In partnership with the Association of Alberta Co-op Seed Cleaning Plants and the Alberta Seed Growers Association, the Regional Annual Silage Trial information are annual printed in the Alberta's Seed Guide (seed.ab.ca). Unfortunately, due to a delay in results in 2021, the Regional Silage Trial data will not be printed in the 2021 guide but will be available on the website at a later date.

# Regional Annual Silage Trial
## Cereals

**Partners:** Canadian Agriculture Partnership
Alberta Agriculture, Forestry and Rural development
Battle River Research Group
Chinook Applied Research Association
Gateway Research Organization
West-Central Forage Association
Peace Country Beef and Forage Association
Philip Amyotte
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**Objectives:**

1. To determine the best yielding cereal forage varieties (barley, oats, triticale/wheat and winter/spring intercrop) for whole plant forage production in Northeastern Alberta.
2. To determine the best quality cereal forage varieties (barley, oats, triticale, wheat and winter/spring intercrop) for cattle feed in Northeastern Alberta.

**Background:**

An important aspect of crop production is variety selection and, with new varieties continually becoming available, current and comprehensive forage variety yield and quality data is essential for Alberta producers. Previous experience with cereal production and the Regional Variety Trials has shown that there can be a 15% increase in production from selecting the best variety, which, on average, can be an increase of $25/acre.

Through the use of experience, neighbors and publication such as the Alberta Seed Guide (seed.ab.ca), we make variety selection decisions to benefit producers. However, there has been a lack of whole-plant annual forage production information to aid us in making cropping decision for forage production.

The purpose of this trial is to supply producers with current and comprehensive annual forage variety yield and quality data for silage, greenfeed or swath grazing in Northeastern Alberta (crop zones 3 and 5) and across the province.

**Method:**

The cereal trials were grown in three blocks of plots: barley, oats and triticale/wheat, in three location: St. Paul (SE13-60-10-W4) and Fort Kent (NE25-61-5-W4) and Smoky Lake (NW59-16-30-W4). The trial blocks were seeded as a randomized complete block design (RCBD) with four replicates to reduce error. The plots measured 1.15 m by 6 m in area.

Agronomic information on the trials can be found in table 1. The trials were seeded using the LARA five-row zero-till small plot drill and blend fertilizer was side-banded at the time of seeding.

The trials in Fort Kent were seeded on May 17, 2021 (barley, oats and triticale/wheat) and the trials in St. Paul were seeded on June 2, 2021 (oats, barley and triticale/wheat, winter/spring). The winter/spring cereal trial was seeded Smoky Lake on May 27, 2021. The trials were sprayed with a 3-point hitch sprayer once during the growing season.

Crop height and stage of maturity was recorded prior to harvest with the LARA alfalfa-Omega self-propelled forage harvester. The total plot weight was recorded and samples were taken to assess dry matter content. Additional composite samples were taken from each variety, frozen and sent to A & L Canada Laboratories for wet chemistry analysis. Statistical analysis was conducted using ARM 9, p = 0.05.

The following varieties were grown in the Regional Annual Silage Trials in 2021:

***Barley***

- *CDC Austenson* – 2-row barley variety with semi-smooth awns, short and strong straw and high feed yield.
- *Altorado* – 2-row, spring feed barley with good resistance to lodging and a fair to good resistance to drought conditions.
- *Amisk* – rough awned, 6-row, semi-dwarf general purpose barley with strong straw for decreased lodging potential.
- *Canmore* – high yielding, 2-row general purpose barley variety with good resistance to lodging.
- *CDC Cowboy* – high yielding, 2-row feed barley variety with excellent standability and improved disease resistance.
- *AB Advantage* – 6-row, smooth-awned feed and forage barley with high grain yield and good agronomic performance.
- *Claymore* – 2-row barley variety developed from CDC Copeland x Xena.
- *AB Cattlelac* – semi-smooth awned barley variety with good lodging resistance, good grain yield and excellent disease resistance.
- *AB Wrangler* – 2 row feed grin and silage variety with high tonnage potential, early to medium maturing, moderate disease resistance.
- *CDC Bow* – 2-row, hulled malting barley with good agronomic performance and grain quality that is widely adapted across western Canada.
- *Sundre* – high yielding, 6-row barley variety with good disease resistance.
- *CDC Maverick* – 2-row, smooth-awned forage barley with high forage yields and good drought tolerance.
- *AB Hauge*- 2 row hulled general purpose barley with potential for forage production, high protein, low NDF and ADF.
- *CDC Churchhill* – high yielding 2-row malt barley variety with lower grain protein than AC Metcalfe and an overall excellent agronomic package.
- *AB Prime* – barley variety developed in Alberta.
- *Esma* – 2-row barley variety with strong yields and agronomic package.
- *Stockford* – hooded, 2-row barley variety suitable for grain production, hay and forage.

- *AB Tofield* - 6-row, awned forage and feed barley wit high yields and good lodging resistance.

***Oats***

- *CDC Baler* – very leafy, forage oat variety.
- *AC Juniper* – early maturing, general purpose oat variety with high yields and strong straw.
- *AC Morgan* – high yielding, later maturing milling oat with good lodging resistance and is commonly used for silage or greenfeed.
- *CDC Haymaker* – later maturing forage oat variety with high forage yields and quality.
- *CS Camden* – milling oat, excellent yield potential, great lodging resistance, short height, and big leaf biomass
- *CDC Arborg* – is a new milling oat with good yield potential, early maturing, lodge resistant.
- *Murphy* – widely adapted forage oat with high yields, improved lodging resistance and is well suited for silage, swath grazing or greenfeed.
- *CDC Nasser* – new feed oat variety with low lignant hull and high oil content.
- *ORE 3542 M* – new white hulled milling oat variety with short, strong straw, good lodging resistance and good grain yields.
- *CDC Endure* – new oat variety with excellent yield and standability.
- *CDC SO-1* – early maturing, very high digestible brown oat variety with high fat content and does not need to be rolled. Short strong straw for reduced lodging.

***Triticale and Wheat***

- *Taza* – reduced awn forage and grain triticale variety with good lodging resistance.
- *Bunker* – early maturing, reduced awn forage variety with great digestibility, high fat content and high silage yields.
- *Sunray* – early maturing, spring triticale variety with improve ergot resistance. Short statured for increased resistance to lodging.
- *AAC Paramount* – soft white spring wheat, midge tolerant, high grain protein, good fit for silage production
- *AAC Awesome* – soft white spring wheat, midge tolerant, high yield, and excellent straw strength, good for silage production.
- *AAC Delight* – spring triticale, reduced awn forage variety with low ergot susceptibility and quality high tonnage.
- *AB Stampeder* – new spring forage triticale variety with reduced awns, shorter stature and increased digestibility.
- *AC Andrew* – soft white spring wheat variety with high yields and short, strong straw.
- *AC Sadash* – semi-dwarf soft white spring wheat variety with high yields, high quality and short, strong straw.
- *KWS Alderon* – high yielding special purpose red spring wheat, short stature, strong straw, late maturing, does well in cooler growing seasons.
- *CS Tracker* – early maturing variety with excellent disease protection and improved protein content. Broad adaptability with high yield potential.

- *WPB Whistler* – high- yielding special purpose wheat with a short strong straw – targeted at the feed/forage and ethanol markets.

**Table 1.** Agronomic Information 2021.

| Trial | Site | # of Varieties | Seeding Date | Seeding Rate | Fertility (lbs/ac) | Weed Control | Harvest Date |
|---|---|---|---|---|---|---|---|
| **Barley** | Fort Kent | 18 | 17-May-21 | 250 lbs/ac | 90-30-20-5 @ 284 lbs/ac | Curtail M | 10-Aug-21 |
| | St. Paul | 18 | 2-June-21 | 250 lbs/ac | 90-30-20-5 @ 284 lbs/ac | Curtail M | 25-Aug-21 |
| **Oats** | Fort Kent | 11 | 17-May-21 | 250 lbs/ac | 90-30-20-5 @ 284 lbs/ac | Curtail M | 9-Aug-21 |
| | St. Paul | 11 | 2-June-21 | 250 lbs/ac | 90-30-20-5 @ 284 lbs/ac | Curtail M | 19-Aug-21 |
| **Triticale/Wheat** | Fort Kent | 12 | 17-May-21 | 250 lbs/ac | 90-30-20-5 @ 284 lbs/ac | Curtail M | 11-Aug-21 |
| | St. Paul | 12 | 2-June-21 | 250 lbs/ac | 90-30-20-5 @ 284 lbs/ac | Curtail M | 25-Aug-21 |
| **Winter/spring** | St. Paul | 12 | 2-June-21 | 125 lbs/ac | 90-30-20-5 @ 284 lbs/ac | Curtail M | 30-Aug-21 |
| | Smoky Lake | 12 | 27-May-21 | 125 lbs/ac | 90-30-20-5 @ 284 lbs/ac | Curtail M | - |

***Results:***

***Barley***

The barley trials are aimed to be harvested at the soft dough stage. There were 18 barley varieties grown in the trials this year at both locations. There were 5 new varieties added to the trial in 2021 including tow recently registered varieties SR18645 or AB Prime and SR17515 or AB Tofield. Two new 2-row barley varieties were added (Esma and Stockford) and one new 6-row barley variety in AB Tofield.

The yield and quality results of the Fort Kent and St. Paul trials can be found in tables 2 and table 3, respectively. The Fort Kent trial was harvested 85 days after seeding and the St. Paul trial was harvested 84 days after seeding. Average moisture content of the Fort Kent trial was 48% and the St. Paul trial was 48%.

As many producers across the province experienced this year with the dry conditions, we saw lower yields at all sites compared to previous years. This year we saw higher average yields in our Fort Kent location of 4.52 ton/acre compared to an average yield in St. Paul at 1.84 ton/acre. The highest yielding variety at both locations was Claymore at 5.31 ton/ac in Fort Kent and 2.25 ton/ac in St. Paul.

In contract to previous years, we saw significant variability between varieties and sites when considering nutritional quality. When considering Crude Protein (CP), the general rule of thumb is 7-9-11 percent for mid-gestation, late-gestation and after calving. The majority of the varieties are adequate to meet the nutrients requirements through mid-gestation to late-gestation at the Fort Kent site, while the majority of varieties show nutritional quality to meet only mid-gestation at the St. Paul site. Total digestible nutrients (TDN), which is the easiest method to estimate the amount of energy in the feed, was fairly consistent between both sites and was adequate to meet the

nutritional requirements through mid-gestation to late-gestation but lacks for after calving following the rules of 55-60-65.

**Table 2.** RST Barley Fort Kent, 2021 (ton/acre, 1 ton = 2000 lbs).

| Variety: | Yield (ton/ac) | | % of Check CDC Austenson | Height (cm) | Moisture (%) | 2021 Quality Results | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | CP (%) | ADF (%) | NDF (%) | TDN (%) | Ca (%) | P (%) | K (%) | Mg (%) |
| **Claymore** | 5.31 | ab | 134.40 | 77.66 | 50.48 | 9.66 | 33.10 | 46.26 | 63.12 | 0.21 | 0.16 | 0.80 | 12.75 |
| **CDC Cowyboy** | 5.06 | ab | 127.99 | 105.80 | 52.51 | 9.90 | 32.81 | 46.11 | 63.34 | 0.20 | 0.17 | 0.73 | 15.67 |
| **CDC Maverick** | 4.98 | ab | 125.92 | 94.00 | 51.66 | 10.34 | 34.02 | 50.03 | 62.40 | 0.22 | 0.17 | 0.72 | 17.98 |
| **CDC Churchill** | 4.91 | ab | 124.35 | 70.70 | 45.14 | 9.14 | 32.19 | 43.73 | 63.82 | 0.20 | 0.20 | 0.74 | 13.28 |
| **CDC Bow** | 4.81 | ab | 121.69 | 68.42 | 47.58 | 9.97 | 34.42 | 48.00 | 62.09 | 0.26 | 0.16 | 0.67 | 12.67 |
| **TR18647/ AB Hauge** | 4.64 | ab | 117.39 | 75.84 | 45.16 | 9.58 | 36.99 | 55.06 | 60.08 | 0.17 | 0.12 | 0.85 | 19.00 |
| **AB Advantage** | 4.63 | ab | 117.26 | 77.09 | 50.58 | 10.40 | 32.69 | 45.82 | 63.43 | 0.22 | 0.14 | 0.95 | 12.51 |
| **AB Wrangler** | 4.63 | ab | 117.26 | 69.83 | 48.02 | 9.13 | 42.89 | 64.34 | 55.49 | 0.32 | 0.08 | 0.81 | 10.38 |
| **SR18647/AB Prime** | 4.56 | ab | 115.41 | 77.92 | 48.24 | 9.87 | 33.65 | 49.21 | 62.69 | 0.19 | 0.16 | 0.86 | 10.67 |
| **Altorado** | 4.35 | ab | 110.10 | 65.17 | 44.81 | 9.07 | 39.33 | 53.99 | 58.26 | 0.16 | 0.11 | 0.55 | 12.09 |
| **Esma** | 4.35 | ab | 110.10 | 67.09 | 43.15 | 9.58 | 35.66 | 49.68 | 61.12 | 0.21 | 0.10 | 0.73 | 12.06 |
| **Canmore** | 4.35 | ab | 109.97 | 67.75 | 47.98 | 9.30 | 38.11 | 54.52 | 59.21 | 0.32 | 0.12 | 0.81 | 12.81 |
| **Sundre** | 4.32 | ab | 109.29 | 70.17 | 47.68 | 10.00 | 38.20 | 55.22 | 59.14 | 0.24 | 0.09 | 1.15 | 14.04 |
| **Stockford** | 4.29 | ab | 108.66 | 70.34 | 52.24 | 9.78 | 37.87 | 54.32 | 59.40 | 0.29 | 0.12 | 0.83 | 14.53 |
| **AB Cattlelac** | 4.16 | b | 108.66 | 77.42 | 47.70 | 9.84 | 37.20 | 51.36 | 59.92 | 0.31 | 0.12 | 1.16 | 18.79 |
| **Amisk** | 4.09 | b | 103.39 | 62.83 | 44.67 | 10.43 | 35.48 | 50.59 | 61.26 | 0.28 | 0.10 | 0.80 | 15.70 |
| **SR 17515/ AB Tofield** | 3.99 | b | 100.86 | 66.34 | 49.38 | 9.96 | 34.46 | 48.02 | 62.06 | 0.27 | 0.16 | 0.76 | 14.33 |
| **CDC Austenson** | 3.95 | b | 100.00 | 63.91 | 49.55 | 10.99 | 34.83 | 51.42 | 61.77 | 0.21 | 0.15 | 0.91 | 12.31 |
| ***Average*** | **4.52** | | | **73.79** | **48.14** | **9.83** | **35.77** | **50.98** | **61.03** | **0.24** | **0.14** | **0.82** | **13.98** |
| ***CV*** | **9.96** | | | | | | | | | | | | |

**Table 3.** RST Barley St. Paul, 2021 (ton/acre, 1 ton = 2000 lbs).

| Variety: | Yield (ton/ac) | % of Check CDC Austenson | Height (cm) | Moisture (%) | CP (%) | ADF (%) | NDF (%) | TDN (%) | Ca (%) | P (%) | K (%) | Mg (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Claymore** | 2.25 | 115 | 54.50 | 47.39 | 6.81 | 28.07 | 49.41 | 67.03 | 0.34 | 0.1 | 1.46 | 35.24 |
| **CDC Cowboy** | 2.24 | 114 | 73.42 | 52.36 | 7.19 | 25.76 | 46.51 | 68.83 | 0.25 | 0.12 | 1.13 | 31.13 |
| **TR18647/AB Hauge** | 2.14 | 109 | 56.09 | 45.90 | 7.5 | 28..58 | 66.64 | 0.42 | 0.42 | 0.1 | 1.62 | 53.35 |
| **CDC Churchill** | 2.10 | 107 | 48.58 | 43.14 | 7.12 | 30.13 | 47.89 | 65.43 | 0.31 | 0.1 | 1.15 | 29.9 |
| **CDC Austenson** | 1.97 | 100 | 52.00 | 49.30 | 6.62 | 29.23 | 50.42 | 66.13 | 0.29 | 0.09 | 1.13 | 31.9 |
| **SR18645/AB Prime** | 1.94 | 99 | 52.83 | 46.34 | 7.12 | 29.88 | 51.61 | 65.62 | 0.38 | 0.1 | 1.34 | 35.93 |
| **Esma** | 1.92 | 98 | 42.92 | 39.03 | 6.56 | 32.03 | 55.77 | 63.95 | 0.36 | 0.09 | 1.12 | 45.86 |
| **AB Wrangler** | 1.82 | 92 | 52.08 | 43.28 | 4.71 | 37.38 | 60.29 | 59.78 | 0.3 | 0.09 | 1.3 | 34.08 |
| **CDC Maverick** | 1.81 | 92 | 66.92 | 57.86 | 6.94 | 27.37 | 45.42 | 67.58 | 0.32 | 0.11 | 1.45 | 33.08 |
| **Canmore** | 1.81 | 92 | 53.17 | 46.34 | 7.12 | 25.84 | 45..24 | 68.77 | 0.3 | 0.1 | 1.22 | 29.85 |
| **Stockford** | 1.79 | 91 | 48.17 | 61.28 | 7.56 | 30.02 | 51.07 | 65.51 | 0.27 | 0.1 | 1.07 | 37.84 |
| **CDC Bow** | 1.74 | 89 | 55.42 | 45.25 | 8.38 | 30.37 | 52.29 | 65.24 | 0.5 | 0.15 | 1.17 | 37.52 |
| **AB Cattlelac** | 1.68 | 86 | 58.50 | 44.26 | 6.31 | 31.7 | 52.59 | 64.21 | 0.37 | 0.11 | 1.37 | 52.25 |
| **Altorado** | 1.65 | 84 | 50.58 | 47.94 | 5.96 | 30.51 | 49.14 | 65.13 | 0.28 | 0.1 | 1.4 | 26.66 |
| **Sundre** | 1.60 | 81 | 58.67 | 53.98 | 6.31 | 30.11 | 50.97 | 65.44 | 0.47 | 0.13 | 1.8 | 53.3 |
| **AB Advantage** | 1.59 | 81 | 67.67 | 51.60 | 7.19 | 29.76 | 50.87 | 65.72 | 0.36 | 0.08 | 1.87 | 36.69 |
| **SR17515/AB Tofield** | 1.56 | 80 | 52.08 | 50.38 | 8.75 | 30.36 | 50.82 | 65.25 | 0.42 | 0.15 | 1.22 | 54.06 |
| **Amisk** | 1.45 | 74 | 39.58 | 47.28 | 6.07 | 35.59 | 60.68 | 61.18 | 0.43 | 0.09 | 1.67 | 39.64 |
| ***Average*** | **1.84** | | **54.62** | **48.49** | **6.90** | **30.24** | **52.49** | **61.73** | **0.35** | **0.11** | **1.36** | **38.79** |
| ***CV*** | **17.66** | | | | | | | | | | | |

### *Oats*

The oat trials are aimed to be harvested at the milk stage. There were 11 oat varieties grown in the trial this year in Fort Kent (NE25-61-5-W4) and St. Paul (SE13-60-10-W4). The results of Fort Kent trial can be found in table 4 and the results of the St. Paul trial can be found in Table 5. The average moisture content at the time of harvest in Fort Kent was 56% and in St. Paul it was 54%. This is the fourth year that the experimental variety ORE3542 M has been included in this trial, which is not yet available to commercial producers. A new variety that was added to our trial this year was CDC Endure.

The Fort Kent trial was harvested at 84 days after seeding and the St. Paul trial was harvested at 78 days after seeding.

Similar to the barley trials, all varieties at both sites yielded lower than average years likely due to the dry environmental conditions experienced during the growing season. The varieties yielded slightly higher at the Fort Kent location with an average of 2.73 tons/acre compared to an average of 2.15 tons/acre at the St. Paul site. The highest yielding variety in Fort Kent was CDC Baler at 4.01 ton/acre followed by CDC Haymaker at 3.49 ton/acre. In contrast, Murphy yielded the highest in St. Paul at 2.58 ton/acre although this was not significantly higher than the other varieties in the trial.

**Table 4.** RST Oats Fort Kent, 2021 (ton/acre, 1 ton = 2000 lbs).

| Variety | Yield (ton/ac) | | % of Check CDC Baler | Height (cm) | Moisture (%) | 2021 Quality Data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | CP (%) | ADF (%) | NDF (%) | TDN (%) | Ca (%) | P (%) | K (%) | Mg (%) |
| **CDC Baler** | 4.01 | a | 100 | 103.92 | 58.71 | 8.19 | 32.28 | 54 | 63.75 | 0.29 | 0.13 | 0.92 | 59.65 |
| **CDC Haymaker** | 3.49 | b | 87 | 94.17 | 56.72 | 8.62 | 34.2 | 52.79 | 62.26 | 0.25 | 0.15 | 0.91 | 56.1 |
| **Murphy** | 3.4 | b | 85 | 106.09 | 56.79 | 7.12 | 35.05 | 59.48 | 61.6 | 0.38 | 0.11 | 1.5 | 63 |
| **CDC Nassar** | 3.21 | b | 80 | 88.92 | 56.74 | 8 | 30.94 | 54.81 | 64.8 | 0.23 | 0.12 | 0.95 | 49.01 |
| **CDC Endure** | 2.77 | c | 69 | 85.67 | 54.91 | 8.31 | 30.95 | 52.41 | 64.79 | 0.18 | 0.14 | 0.82 | 46.46 |
| **CDC Arborg** | 2.68 | c | 67 | 88.17 | 54.94 | 7.12 | 35.04 | 60.15 | 61.6 | 0.28 | 0.12 | 1.88 | 65.09 |
| **AC Morgan** | 2.45 | cd | 61 | 82.92 | 56.8 | 6.69 | 38.62 | 62.49 | 58.82 | 0.3 | 0.08 | 1 | 56.55 |
| **CDC S0-1** | 2.16 | de | 54 | 71.84 | 52.76 | 8 | 33.5 | 58.71 | 62.8 | 0.28 | 0.12 | 1.47 | 58.3 |
| **CS Camden** | 2.09 | de | 52 | 75.42 | 53.41 | 9.25 | 29.22 | 49.45 | 66.14 | 0.36 | 0.18 | 1.36 | 59.8 |
| **AC Juniper** | 2.06 | de | 51 | 81.25 | 56.25 | 6.81 | 37.5 | 59.1 | 59.69 | 0.39 | 0.09 | 1.88 | 71.66 |
| **ORE 3542M** | 1.71 | e | 43 | 75.17 | 59.51 | 8.69 | 31.81 | 54.66 | 64.12 | 0.18 | 0.14 | 0.72 | 48.34 |
| ***Average*** | **2.73** | | | **86.69** | **56.14** | **7.89** | **33.56** | **56.19** | **62.76** | **0.28** | **0.13** | **1.22** | **57.63** |
| ***CV*** | **10.7** | | | | | | | | | | | | |

**Table 5.** RST Oats St. Paul, 2021 (ton/acre, 1 ton = 2000 lbs).

| Variety | Yield (ton/ac) | | % of Check CDC Baler | Height (cm) | Moisture (%) | 2021 Quality Data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | CP (%) | ADF (%) | NDF (%) | TDN (%) | Ca (%) | P (%) | K (%) | Mg (%) |
| **Murphy** | 2.58 | a | 122 | 100.49 | 54.35 | 5.33 | 38.04 | 64.15 | 59.27 | 0.28 | 0.08 | 1.34 | 63.8 |
| **ORE 3542M** | 2.44 | a | 116 | 77.70 | 53.56 | 5.29 | 35.12 | 54.88 | 61.54 | 0.25 | 0.12 | 1.29 | 65.7 |
| **CDC Haymaker** | 2.44 | a | 116 | 88.92 | 58.45 | 6.5 | 34.05 | 59.68 | 62.38 | 0.41 | 0.08 | 1.35 | 89.8 |
| **CDC Endure** | 2.43 | a | 115 | 83.35 | 52.21 | 5.64 | 34.35 | 53.77 | 62.14 | 0.26 | 0.15 | 1.31 | 14.9 |
| **CDC Arborg** | 2.36 | a | 112 | 80.25 | 52.81 | 6.24 | 32.37 | 55.36 | 63.4 | 0.27 | 0.12 | 1.26 | 49.35 |
| **CDC Nassar** | 2.21 | a | 105 | 79.24 | 55.15 | 6.25 | 37.26 | 60.24 | 59.87 | 0.35 | 0.12 | 1.54 | 44.1 |
| **AC Juniper** | 2.13 | a | 101 | 79.33 | 45.28 | 4.11 | 37.21 | 60.68 | 59.91 | 0.31 | 0.09 | 1.52 | 91.51 |
| **CDC Baler** | 2.11 | a | 100 | 85.00 | 56.64 | 4.86 | 32.83 | 53.52 | 63.33 | 0.33 | 0.13 | 1.13 | 75.64 |
| **AC Morgan** | 2.08 | a | 99 | 80.84 | 52.47 | 4.1 | 39.81 | 62.59 | 57.89 | 0.44 | 0.07 | 1.78 | 61.64 |
| **CS Camden** | 1.90 | a | 90 | 75.00 | 52.24 | 5.43 | 37.64 | 57.98 | 59.58 | 0.36 | 0.09 | 1.27 | 78.9 |
| **CDC SO-1** | 1.05 | b | 50 | 64.00 | 57.79 | 5.08 | 35.27 | 63.04 | 61.42 | 0.42 | 0.08 | 1.4 | 114.26 |
| ***Average*** | **2.15** | | | **81.28** | **53.72** | **5.35** | **35.81** | **58.72** | **60.98** | **0.33** | **0.10** | **1.38** | **68.15** |
| ***CV*** | **22.32** | | | | | | | | | | | | |

### *Triticale and Wheat*

The triticale and wheat trials are targeted to be harvested at the late milk stage. This year there were 7 wheat varieties and 5 spring triticale varieties in the trials. The results of the Fort Kent and St. Paul trials can be found in tables 6 and 7, respectively. The Fort Kent trial was harvested 85 days after seeding and the St. Paul trial was 86 days after seeding.

The trials yielded higher in the Fort Kent trial at an average of 4.33 tons/acre and compared to an average of 2.16 ton/acre in St. Paul. Bunker was the highest yielding variety in Fort Kent at 4.95 ton/acre while Sunray was the highest yielding variety in St. Paul at 2.76 ton/acre.

The quality in Fort Kent trial averaged CP at 8.16% while the St. Paul trial averaged at 6.40% while TDN was 65.95% in Fort Kent and 63.18% in St. Paul.

**Table 6.** RST Triticale Fort Kent, 2021 (ton/ac, 1 ton = 2000 lbs).

| Variety | Yield (ton/ac) | % of Check Taza | Height (cm) | Moisture (%) | 2021 Quality Data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | CP (%) | ADF (%) | NDF (%) | TDN (%) | Ca (%) | P (%) | K (%) | Mg (%) |
| **Bunker** | 4.95 | 119 | 79.72 | 38.50 | 9.1 | 30.85 | 54.29 | 64.87 | 0.18 | 0.15 | 0.85 | 24.95 |
| **AAC Delight** | 4.91 | 119 | 79.82 | 40.79 | 6.93 | 35.42 | 55.59 | 61.31 | 0.14 | 0.11 | 0.74 | 20.38 |
| **CS Tracker** | 4.76 | 115 | 83.75 | 50.44 | 8.15 | 27.69 | 44.9 | 67.33 | 0.16 | 0.15 | 0.87 | 21.19 |
| **AAC Paramount** | 4.67 | 113 | 82.58 | 48.16 | 7.16 | 27.58 | 49.17 | 67.42 | 0.14 | 0.16 | 0.77 | 19.64 |
| **AC Sadash** | 4.64 | 112 | 92.04 | 44.04 | 7.2 | 32.29 | 53.1 | 63.75 | 0.17 | 0.13 | 0.87 | 29.3 |
| **AAC Awesome** | 4.53 | 109 | 75.00 | 43.60 | 8.63 | 28.07 | 52.14 | 67.03 | 0.13 | 0.17 | 0.82 | 19.05 |
| **Sunray** | 4.21 | 101 | 79.67 | 41.84 | 8.6 | 31.49 | 52.06 | 64.37 | 0.12 | 0.15 | 0.64 | 14.27 |
| **WPB Whistler** | 4.16 | 100 | 78.00 | 52.22 | 8.77 | 29.35 | 48.56 | 66.04 | 0.19 | 0.17 | 0.96 | 21.97 |
| **Taza** | 4.15 | 100 | 82.82 | 50.12 | 8.27 | 26.91 | 46.81 | 67.94 | 0.14 | 0.15 | 0.73 | 20.41 |
| **Alderon** | 4.05 | 98 | 72.33 | 38.61 | 8.46 | 28.36 | 48.36 | 66.81 | 0.15 | 0.15 | 0.87 | 0.18 |
| **AC Andrew** | 3.51 | 85 | 79.09 | 50.22 | 8.56 | 25.4 | 46.49 | 69.11 | 0.12 | 0.19 | 0.64 | 14.02 |
| **T256/ AB Stampeder** | 3.44 | 83 | 74.75 | 48.75 | 8.05 | 30.1 | 51.31 | 65.45 | 0.14 | 0.14 | 0.88 | 21.69 |
| ***Average*** | **4.33** | | **79.96** | **45.61** | **8.16** | **29.46** | **50.23** | **65.95** | **0.15** | **0.15** | **0.80** | **18.92** |
| ***CV*** | **16.22** | | | | | | | | | | | |

**Table 7.** RST Triticale St. Paul, 2021 (ton/ac, 1 ton = 2000 lbs).

| Variety | Yield (ton/ac) | % of Check Taza | Height (cm) | Moisture (%) | 2021 Quality Data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | CP (%) | ADF (%) | NDF (%) | TDN (%) | Ca (%) | P (%) | K (%) | Mg (%) |
| **Sunray** | 2.76 | 155 | 85.34 | 55.11 | 7.25 | 25.67 | 46.94 | 68.9 | 0.16 | 0.12 | 1.05 | 39.79 |
| **AAC Paramount** | 2.58 | 145 | 74.75 | 48.50 | 4.88 | 41.56 | 64.58 | 56.52 | 0.22 | 0.07 | 1.02 | 42 |
| **AAC Awesome** | 2.57 | 144 | 74.35 | 53.23 | 4.22 | 36.3 | 53.25 | 60.62 | 0.16 | 0.14 | 1.12 | 22.16 |
| **AC Andrew** | 2.42 | 136 | 66.00 | 50.62 | 6.75 | 36.69 | 59.4 | 60.32 | 0.26 | 0.09 | 1.27 | 56.45 |
| **T256/ AB Stampeder** | 2.39 | 134 | 75.25 | 53.00 | 6.25 | 34.37 | 57.12 | 62.13 | 0.19 | 0.1 | 0.88 | 55.25 |
| **AAC Delight** | 2.25 | 93 | 72.66 | 54.74 | 6.56 | 28.97 | 49.36 | 66.33 | 0.17 | 0.14 | 0.82 | 38.18 |
| **AC Sadash** | 2.01 | 113 | 69.00 | 48.26 | 5.41 | 35.02 | 60.45 | 61.62 | 0.19 | 0.13 | 1.17 | 31.58 |
| **Alderon** | 1.96 | 110 | 60.17 | 55.63 | 6.11 | 32.68 | 54.26 | 63.44 | 0.17 | 0.11 | 1.15 | 42.8 |
| **Bunker** | 1.88 | 105 | 80.92 | 63.19 | 6.09 | 32.85 | 53.39 | 63.31 | 0.2 | 0.12 | 1.06 | 53.75 |
| **Taza** | 1.79 | 100 | 82.58 | 59.43 | 8.12 | 28.48 | 52.52 | 66.71 | 0.23 | 0.14 | 0.97 | 56 |
| **WPB Whistler** | 1.74 | 98 | 65.77 | 57.21 | 6.05 | 36.58 | 54.94 | 60.4 | 0.21 | 0.09 | 1.37 | 68.49 |
| **CS Tracker** | 1.57 | 88 | 60.35 | 45.44 | 9.06 | 27.03 | 46.53 | 67.84 | 0.2 | 0.14 | 0.84 | 57.25 |
| ***Average*** | **2.16** | | **72.26** | **53.70** | **6.40** | **33.02** | **54.395** | **63.178** | **0.197** | **0.1158** | **1.06** | **46.975** |
| ***CV*** | **22.9** | | | | | | | | | | | |

### *Winter/Spring Cereal Intercrop*

The winter/spring cereal intercrop trial was harvested at the recommended stage for the spring cereals. The trial was established in St. Paul and Smoky Lake County and the following four winter cereal varieties were used in mixtures with Taza triticale, CDC Austenson Barley and CDC Baler oats:

- *AAC Wildfire* – hard red winter wheat, short strong straw, good winter survival, excellent lodging resistance.
- *Bobcat* -
- *Prima* – fall rye variety with high yields and is well adapted to Western Canada.
- *Luoma* – winter triticale, has no awns, high yield potential, and good disease resistance.

The trial in Fort Kent was harvested at the recommended stage for the spring cereals on September 8th, 2020 at 89 days after seeding. Results of the Fort Kent trial can be found in table 8. The highest yielding mixture was Bobcat/CDC Austenson at 2.76 ton/acre. Overall, the mixtures with CDC Baler were among the top yielding varieties while the mixtures with Taza triticale were among the lower yielding. Unfortunately, due to weather, the Smoky Lake site was unable to be harvested with usable data.

**Table 8.** RST Winter/Spring Cereal Intercrop Fort Kent, 2021 (ton/ac, 1 ton = 2000 lbs).

| Variety | Yield (ton/acre) | | % of Check CDC Austenson | S Height (cm) | W Height (cm) | Moisture (%) | Quality Results 2021 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | CP (%) | ADF (%) | NDF (%) | TDN (%) | Ca (%) | P (%) | K (%) | Mg (%) |
| CDC Austenson | 3.36 | a | 100.00 | 63.50 | - | 38.68 | 8.16 | 34.98 | 46.72 | 61.65 | 0.24 | 0.12 | 1.04 | 35.62 |
| CDC Baler | 3.27 | a | 97.18 | 95.17 | - | 52.04 | 8.22 | 37.78 | 52.79 | 59.47 | 0.33 | 0.24 | 1.14 | 45.41 |
| Bobcat/CDC Austenson | 2.76 | ab | 82.07 | 57.99 | 24.69 | 52.04 | 10.73 | 34.69 | 48.44 | 61.88 | 0.38 | 0.17 | 1.87 | 66.45 |
| Prima/CDC Baler | 2.58 | bc | 76.72 | 91.09 | 22.08 | 55.87 | 7.73 | 37.72 | 50.61 | 59.52 | 0.38 | 0.25 | 1.30 | 71.95 |
| AAC Wildfire/CDC Baler | 2.54 | bc | 75.47 | 90.33 | 20.08 | 55.63 | 8.14 | 37.77 | 50.82 | 59.48 | 0.38 | 0.21 | 1.21 | 54.00 |
| Bobcat/CDC Baler | 2.44 | bc | 72.41 | 89.50 | 19.59 | 55.89 | 9.37 | 35.81 | 49.51 | 61.00 | 0.25 | 0.24 | 1.00 | 61.55 |
| Luoma/CDC Baler | 2.32 | bc | 68.99 | 91.08 | 20.92 | 53.78 | 7.85 | 38.28 | 51.15 | 59.08 | 0.37 | 0.20 | 1.16 | 59.75 |
| Taza | 2.30 | bc | 68.39 | 84.58 | - | 53.90 | 9.35 | 38.28 | 55.93 | 59.08 | 0.23 | 0.17 | 1.12 | 0.09 |
| Prima/CDC Austenson | 2.13 | bcd | 63.34 | 72.41 | 22.95 | 56.97 | 8.35 | 34.87 | 47.85 | 61.74 | 0.37 | 0.21 | 168.00 | 25.09 |
| Luoma/CDC Austenson | 2.11 | bcd | 62.74 | 67.77 | 23.66 | 55.50 | 9.31 | 35.02 | 47.23 | 61.62 | 0.46 | 0.23 | 1.83 | 44.24 |
| AAC Wildfire/CDC Austenson | 1.88 | cde | 56.02 | 60.08 | 19.06 | 48.28 | 8.32 | 37.49 | 50.75 | 59.70 | 0.30 | 0.14 | 1.29 | 37.33 |
| Bobcat/Taza | 1.44 | def | 42.76 | 77.00 | 24.83 | 69.14 | 11.42 | 38.39 | 56.50 | 58.99 | 0.29 | 0.28 | 1.88 | 45.47 |
| Wildfire/Taza | 1.40 | def | 41.75 | 84.66 | 22.66 | 60.08 | 11.99 | 38.25 | 57.51 | 59.10 | 0.45 | 0.14 | 1.71 | 115.60 |
| Luoma/Taza | 1.25 | efg | 37.17 | 78.42 | 25.84 | 63.32 | 10.74 | 36.07 | 51.02 | 60.80 | 0.35 | 0.16 | 1.41 | 85.20 |
| Prima/Taza | 1.20 | efg | 35.68 | 60.08 | 19.06 | 48.28 | 10.45 | 39.45 | 55.99 | 58.17 | 0.41 | 0.17 | 1.88 | 72.70 |
| Bobcat | 0.91 | fg | 26.91 | - | 73.17 | 80.34 | 12.94 | 35.54 | 54.01 | 61.21 | 0.33 | 0.34 | 2.37 | 42.85 |
| Luoma | 0.57 | g | 16.95 | - | 21.75 | 71.83 | 14.65 | 33.70 | 48.12 | 62.65 | 0.89 | 0.28 | 3.05 | 183.56 |
| ***Average*** | **2.03** | | | **77.58** | **25.74** | **57.15** | **9.87** | **36.71** | **51.47** | **60.30** | **0.38** | **0.21** | **11.37** | **61.58** |
| ***CV*** | **18** | | | | | | | | | | | | | |

# Regional Annual Silage Trial
## Pulse Mixtures

**Partners:** Alberta Agriculture, Forestry and Rural Economic Development
SECAN
Chinook Applied Research Association
West-Central Forage Association
SARDA Crop Research
Battle River Research Group
Canadian Agriculture Partnership

**Objectives:**

1. To determine which pea-cereal mixtures are a feasible option when compared to conventional cereal forage crops for whole plant forage production, considering both yield and quality.

**Background:**

The most commonly utilized forage crops are typically monocultures of barley, oats or triticale. Despite this, there are other annuals available that could provide an alternative crop for forage production or to extend the grazing season. The use of corn has significantly increased in recent years as a method of extending the grazing season. The use of alternative annual crops can provide a break in disease from cereal production or as a break in perennial cropping rotation while still providing a forage crop.

The inclusion of peas into the production of an annual cereal crop can provide multiple benefits over the use of a monoculture crop. Fertilizer costs could be reduced due to the ability of peas to fix nitrogen which could also impact overall soil fertility. Peas have a high protein content and will therefore add protein to the overall forage quality.

This year the pea/cereal trial expanded its pulse species and incorporated a Faba Bean treatment into the trial. Fertilizer costs can also be reduced as faba beans have the ability to fix nitrogen which could impact overall soil fertility. As well, faba beans have a high source of protein content which can add protein to your feed quality.

**Method:**

The trial was established at the LARA Fort Kent Research Site (NE25-61-5-W4) June 1st, 2021 and at our St. Paul site (Se13-60-10-W4) on May 12th, 2021 in a randomized complete block design (RCBD) with four replicates to reduce error. The plots were seeded with the LARA five-row zero-till small plot drill to a depth of 1.5 – 2" to try and reach an intermediate between cereal and pea recommendations. The peas were inoculated prior to seeding.

Cereal monocultures of CDC Baler oats, Taza triticale and CDC Austenson barley were established as check treatments for comparison to the pea/cereal mixtures. The trial was seeded

with 15 treatments and each cereal variety was seeded in a mixture with Aberdeen Field Peas, DL Delicious Field Peas, Snowbird Faba beans and DL Tesoro Faba beans.

Agronomic information on the trial can be found in table 1. No in-crop herbicide applications were performed for weed control due to the mixture of broadleaf and grassy plants. Therefore, hand-weeding was done where necessary.

The LARA alfalfa-omega self-propelled forage harvester was used to harvest the plots at the recommended cereal harvest date + 10 days. The individual plot weights were recorded and samples were taken to assess dry matter content. An additional composite sample was taken from each variety, frozen and sent to A & L Canada Laboratories for wet chemistry analysis. Statistical analysis of the data was conducted using ARM 9, $p = 0.05$.

The following varieties were used in the pea/cereal trial in 2021:

- *CDC Austenson barley* - 2-row barley variety with semi-smooth awns, short and strong straw and high feed yield.
- *CDC Baler oats* - very leafy, forage oat variety.
- *Taza triticale* – reduced awn forage and grain triticale variety with good lodging resistance.
- *Aberdeen Peas* – semi leafless yellow pea variety with high yield and excellent standability.
- *DL Delicious Peas* – new semi leafless forage pea with high yields, good standability and early maturity.
- *DL Tesoro faba beans* - high yielding, zero tannin faba bean variety with great agronomic traits.
- *Snowbird faba beans* – zero tannin, medium size seed, resistant to root rot, good source of protein and energy.

**Table 1.** RST Pea/Cereal Mixture Agronomic Information, 2021.

| Site | Date Seeded | Date Harvested | Rain (mm) | Treatments | Seeding Rate | Fertility |
|---|---|---|---|---|---|---|
| **Fort Kent** | 1-June-21 | 17-Aug-21 | | Austenson | 300 plants/m2 | 50% of recommended cereal rate |
| **St. Paul** | 12-May-21 | 12-Aug-21 | | CDC Baler | 300 plants/m2 | 50% of recommended cereal rate |
| | | | | Taza | 370 plants/m2 | 50% of recommended cereal rate |
| | | | | Austenson/Aberdeen | 150 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | Austenson/DL Delicious | 150 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | Austenson/DL Tesoro | 150 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | Austenson/Snowbird | 150 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | CDC Baler/Aberdeen | 150 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | CDC Baler/DL Delicious | 150 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | CDC Baler/DL Tesoro | 150 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | CDC Baler/Snowbird | 150 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | Taza/Aberdeen | 185 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | Taza/DL Delicious | 185 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | Taza/DL Tesoro | 185 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |
| | | | | Taza/Snowbird | 185 pl/m2, 57 pl/m2 | 50 lbs/acre of 11-52-0-0 |

**Results:**

The trial is aimed to be harvested at the recommended cereal stage plus 10 days to try and account for the increased moisture content of the forage with the inclusion of peas. In previous years, the trial was harvested at the recommended cereal stage. However, the Forage Pea trials conducted at LARA for four years found that optimal yields and quality could be achieved if harvest was delayed by at least 10 days. The results of the pea-cereal trial are summarized in table 2.

Unfortunately, there was a mix-up in data collection for the St. Paul site and, as a result, the data has not been reported. The highest yielding mixtures at the Fort Kent site was CDC Austenson/Aberdeen at 3.35 ton/ac. Two other mixtures including CDC Austenson (with DL Delicious and DL Tesoro) were among the top yielding as well.

One of the primary reasons for including pulses in a silage mixture is for the potential boost in protein. In contrast to previous years of this trial, we did not see a significant improvement in nutritional quality with pulses included in the mixture. This may have been the result of the dry growing conditions experienced this past summer.

**Table 2.** RST Pea/Cereal Mixture Fort Kent, 2021 (ton/ac, 1 ton = 2000 lbs).

| Variety | Yield (ton/acre) | | % of Check CDC Austenson | P Height (cm) | C Height (cm) | Moisture (%) | Quality Results 2021 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | CP (%) | ADF (%) | NDF (%) | TDN (%) | Ca (%) | P (%) | K (%) | Mg (%) |
| CDC Austenson | 3.69 | a | 100 | - | 81.186 | 59.535 | 9.33 | 33.76 | 53.31 | 62.6 | 0.82 | 0.12 | 0.65 | 23.95 |
| CDC Baler | 3.35 | ab | 91 | - | 104.7 | 64.962 | 9.52 | 25.59 | 40.12 | 68.97 | 0.36 | 0.73 | 0.11 | 18.41 |
| CDC Austenson + Aberdeen | 3.29 | ab | 89 | 73.892 | 85.065 | 63.141 | 7.84 | 29.17 | 47.34 | 66.18 | 0.25 | 0.18 | 0.8 | 36.73 |
| CDC Austenson + DL Delicious | 2.75 | abc | 75 | 68.915 | 73.25 | 61.308 | 8.21 | 33.78 | 55.76 | 62.59 | 0.25 | 1.01 | 0.17 | 28.25 |
| CDC Austenson + DL Tesoro | 2.66 | abc | 72 | 60.226 | 74.619 | 68.821 | 8.79 | 34 | 51.61 | 62.41 | 0.56 | 0.13 | 0.76 | 19.92 |
| CDC Baler + Dl Delicious | 2.66 | abc | 72 | 59.58 | 88.668 | 61.365 | 8.83 | 31.23 | 45.78 | 64.57 | 0.5 | 0.81 | 0.15 | 33.39 |
| Taza | 2.63 | abc | 71 | - | 94.065 | 59.638 | 7.53 | 27.78 | 45.86 | 67.26 | 0.15 | 0.83 | 0.14 | 32.12 |
| CDC Baler + Aberdeen | 2.59 | abc | 70 | 71.583 | 94.083 | 64.288 | 7.03 | 42.8 | 58.24 | 55.56 | 0.78 | 0.1 | 0.52 | 21.8 |
| Taza + Aberdeen | 2.52 | abc | 68 | 71.668 | 86.085 | 66.53 | 7.75 | 29.2 | 47.9 | 66.15 | 0.34 | 0.88 | 0.11 | 21.33 |
| Taza + DL Delicous | 2.41 | abc | 65 | 70.75 | 85.833 | 64.965 | 9.91 | 31.53 | 50.48 | 64.34 | 0.49 | 0.82 | 0.16 | 46.56 |
| CDC Baler + Snowbird | 2.34 | abc | 63 | 56.583 | 97.503 | 65.478 | 10.42 | 27.47 | 37.65 | 67.5 | 0.76 | 0.13 | 0.67 | 15.13 |
| Taza + DL Tesoro | 2.19 | bc | 59 | 63.418 | 88.253 | 69.715 | 6.6 | 30.3 | 52.16 | 65.3 | 0.26 | 0.11 | 0.91 | 39.87 |
| CDC Austenson + Snowbird | 2.15 | bc | 58 | 62.583 | 74.753 | 68.99 | 9.4 | 33.25 | 50.99 | 63 | 0.67 | 0.74 | 0.18 | 32.75 |
| Taza + Snowbird | 1.89 | c | 51 | 65.083 | 89.668 | 69.913 | 8.54 | 29.56 | 52.52 | 65.87 | 0.38 | 0.14 | 1.01 | 38.64 |
| CDC Baler + DL Tesoro | 1.69 | c | 46 | 42.424 | 73.48 | 62.595 | 7.61 | 34.78 | 54.69 | 61.81 | 0.5 | 0.11 | 0.83 | 33.95 |
| **Average** | **2.59** | | | **63.89** | **86.08** | **64.75** | **8.49** | **31.61** | **49.63** | **64.27** | **0.47** | **0.46** | **0.48** | **29.52** |
| **CV** | **21.2** | | | | | | | | | | | | | |

# Regional Annual Silage Trial
## Alternative Crops

**Partners:** West-Central Forage Association
Chinook Applied Research Association
Peace Country Beef and Forage Association
Battle River Research Group
North Peace Applied Research Association
Alberta Agriculture, Forestry and Rural Economic Development

**Objectives:**

1. To determine the best yielding alternative forage crops for whole plant forage production in Northeastern Alberta.
2. To determine the best quality alternative forage crops for cattle feed in Northeastern Alberta.

**Background:**

The inclusion of 'alternative' or 'high nutritive value' forages, including chicory and plantain that are known for increased energy and protein content and reduced neutral detergent fiber (NDF), in the rations of beef cattle could have an environmental, economical and production benefit to Alberta producers. Currently, research has focused on assessing the yield and quality of cocktail mixtures that contain from 2 to 20 different species with very little data available on individual species. As well, there has been limited research focusing on replicated trials to establish baseline information on these forage species. Consequently, most current recommendations to producers on the use of these crops is coming from anecdotal sources.

Recent research from New Zealand on the use of 'alternative' crops in sheep and cattle diets is showing promising results in feed intake and environmental impacts. A study on chicory and plantain has shown the potential of reduced environmental impacts of these forages through decreased rumen ammonia and urine nitrogen in dairy cattle (Minnee et al. 2017). These results are supported by similar research on plantain-fed dairy heifers done by Cheng et al. (2017). A study by Edwards et al. (2014) showed high consumption of forage beet, kale and kale-oat mixtures by grazing dairy cows and almost complete consumption of beet.

The purpose of this trial is to provide current and comprehensive regional yield and quality data on annual 'alternative' forage species and varieties for silage, greenfeed and grazing producers across Alberta and Saskatchewan in order to improve on-farm feed production and efficiency.

**Method:**

The trial was established at the LARA Fort Kent Research Site (NE25-61-5-W4) on June 1st, 2021and at our St. Paul site (SE13-60-10-W4) on June 2nd, 2021 in a randomized complete block design (RCBD) with four replicates to reduce error. The plots were seeded using the LARA five-row Fabro zero-till drill to a depth of ½ inch.

Soil tests were taken in the spring at both sites and a blend fertilizer (90-30-20-5) was side-banded during seeding at 284 lbs/ac. The trial was hand-weeded during the growing season when necessary. There was no in-crop herbicide application in these trials.

Crop height and stage of maturity was recorded prior to harvest with the LARA alfalfa-omega self-propelled forage harvester. The total plot weight was recorded and samples were taken to assess dry matter content. Additional composite samples were taken from each treatment, frozen and sent to A & L Canada Laboratories for wet chemistry analysis. Statistical analysis of the data was conducted ARM 9, P = 0.05.

The following alternative crops were used for the trial in 2021:

- *Japanese Millet* – annual, warm season grass that is commonly grown as a late season green forage. The most rapidly growing of the millet, its fibrous root system makes it an excellent smother crop, erosion protector and trap crop. Highly tolerant of frequent cutting, is fairly drought tolerant once established and tolerant of wet soils.
- *Sorghum Sudan Grass* – tall, fast-growing, heat-loving warm season grass is unrivaled for adding organic matter to worn-out soils. High biomass production and can be a good soil aerator particularly if mowed/cut at least once during the growing season. High seeding rates can allow for excellent weed suppression and can be used as a good crop to break the life cycle of disease pests.
- *Forage Brassica* – fast-growing, high yielding and high-quality forages that are excellent for use in fall pastures. Protein content can range from 18 to 25%. Can be difficult to ensile due to high moisture content but holds quality late into the season.
- *Forage Kale* – fast growing, very competitive against annual weeds, can be planted in the spring or fall time in pastures and cover crops, fast germination rate, winter hardy brassica, and has good feed value.
- *Forage Radish* – fast growing, drought tolerant forage radish that can be grazed multiple times due to its rapid regrowth. Highly digestible to livestock, with high energy levels and great persistence.
- *Forage Turnip* – cold and drought tolerant, can be planted late in the season if wanting to graze in the fall, good feed quality for feeding livestock.
- *Plantain* – highly palatable herb with a fibrous root system that establishes rapidly under the right conditions. Highly tolerant to heat, good pest tolerance and has a high mineral content. Plantain will las 2 to 3 years under grazing conditions.
- *Chicory* – short-lived, leafy herb with a high feed value for livestock. Can be incorporated into rotational grazing systems with good summer forage yields. Has a deep taproot that can support growth in dry conditions and breaks up soil compaction.
- *Phacelia* – unique cover crop species with a very intense soil conditioning effect in the top two inches of the soil. Not a deep-rooted plant, but can be very effective to aggregate soil particles into the crumbly aggregate structure. Fast growing with purple flowers that is excellent as a beneficial insect plant.
- *Red Serbian Millet* – fast-growing, high yielding leafy warm-season grass that can be used for late season grazing systems. Creates a soft-palatable feed and is ideal for high temperature regions.

**Results:**

The trial was harvested at the industry recommended stage for each individual crop. The yield and quality results from the trial are summarized in table 1. The trial at the Fort Kent Site (LARA) was harvested on August 5, 2021. Unfortunately, due to weather, the St. Paul site was not harvested.

Similar to the other Regional Silage Trials, the alternative trial yielded much lower than in previous years and the drought stress was obvious throughout the growing season. The highest yielding alternative species was Red Serbian Millet at 1.84 ton/acre and the lowest yielding species was forage kale at 0.35 ton/acre.

As expected, the species with the highest CP content was Chicory at 18.52%. Alternative forage species are well known for their high nutritive quality, which has led to their use in cocktail mixtures to boost nutritional content of cattle feed. All of the variety's, except for Forage Brassica and Forage Radish, are adequate to meet cattle CP requirements through gestation and into lactation. Due to these species high nutritional quality, it is recommended to include them in cattle rations in combination with at least one cereal crop.

**Table 1.** RST Alternative Crops Fort Kent Data, 2021 (ton/ac, 1 ton = 2000 lbs).

| Variety: | Yield (ton/ac) | | % of Check CDC Austenson | Height (cm) | Moisture (%) | 2021 Quality Results | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | CP (%) | ADF (%) | NDF (%) | TDN (%) | Ca (%) | P (%) | K (%) | Mg (%) |
| **Millet** | 1.84 | a | 316.38 | 92.94 | 68.10 | 12.16 | 35.75 | 56.55 | 61.05 | 0.32 | 4.73 | 0.17 | 26.05 |
| **Max Radish** | 1.43 | b | 246.38 | 97.18 | 82.50 | 14.3 | 39.32 | 45.58 | 58.27 | 1.09 | 2.74 | 0.17 | 38.21 |
| **Phacelia** | 1.21 | b | 207.76 | 64.39 | 80.38 | 11.98 | 41.8 | 47.23 | 56.34 | 2.74 | 4.84 | 0.17 | 69.69 |
| **Forage Radish** | 0.86 | cde | 148.28 | 90.67 | 86.05 | 9.72 | 44.78 | 55.44 | 54.02 | 0.32 | 2.81 | 0.17 | 58.3 |
| **Sorghum Sudan Grass** | 0.76 | cde | 130.69 | 104.05 | 75.60 | 10.24 | 48.04 | 51.33 | 51.48 | 0.47 | 3.21 | 0.17 | 8.39 |
| **Plantain** | 0.68 | cde | 116.38 | 33.67 | 79.83 | 11.09 | 47.26 | 50.21 | 52.08 | 0.4 | 3.03 | 0.17 | 0.32 |
| **Chicory** | 0.58 | cde | 100.00 | 34.42 | 84.28 | 18.52 | 30.91 | 40.81 | 64.82 | 1.15 | 5.93 | 0.17 | 49.58 |
| **Forage Brassica** | 0.45 | de | 76.72 | 23.15 | 75.67 | 8.55 | 41.86 | 54.2 | 56.29 | 0.25 | 3.74 | 0.14 | 98.55 |
| **Forage Turnip** | 0.39 | de | 67.76 | 25.67 | 78.20 | 12.68 | 32.28 | 36.59 | 63.75 | 0 | 3.11 | 0.15 | 0.01 |
| **Forage Kale** | 0.35 | e | 60.00 | 33.67 | 78.95 | 10.65 | 44.85 | 54.66 | 53.96 | 0.37 | 4.04 | 0.16 | 131.6 |
| ***Average*** | **0.85** | | | **59.98** | **78.95** | **11.99** | **40.69** | **49.26** | **57.21** | **0.71** | **3.82** | **0.16** | **48.07** |
| ***CV*** | | | | | | | | | | | | | |

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