LUARS Research 2023 – Results from Forage Experiments

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This note summarizes research on forage crops at LUARS (https://www.lakeheadu.ca/centre/luars) Thunder Bay. The note doesn't include results only from this year, but also from the previous years, if the experiments were conducted for more than one or two years. I am sure the farmers will find the note useful.

Spring Barley Varieties for Forage Production:

- Eighteen varieties were evaluated for forage production.
- Highest forage dry matter yield was registered by *CH1209-1* (15.4 MT/ha; 8.8 % protein). Next two best yielding varieties were *Boroe* (13.0 MT/ha; 8.5 % protein) and *AB Cattelac* (12.5 MT/ha; 12.5 % protein). *Amberly*, last year's top yielding variety, yielded 11.5 MT/ha (with highest protein content - 13.8 %) this year.
- *AB Hague* (12.9 % protein) and *AB Wrangler* (12.4 % protein) were the next best varieties to *Amberly* in the protein content (13.8 %).
- Averaged over 2021-2023, *Amberly/Oceanik* (10.16 MT/ha), *Boroe* (9.87 MT/ha) and *AB Tofield* (9.81 MT/ha) were the four top forage producing varieties.
- Averaged over 2021-2023, *AB Hague* (12.5 %), *AB Tofield* (11.5 %) and *AB Advantage* (11.4 %) were top ranking varieties for protein content.
- RFV was highest in *Esma* (151) followed closely by *Oceanik* (147) and *Amberly* (146).
- Averaged over 2021-2023, *Oceanik* had the highest RFV (155). Two next best varieties in RFV were *Chambly* (134) and *AB Wrangler* (133).
- *Considering the dry matter yield, Amberly, Oceanik, Boroe and AB Tofield (6 row barley; a dual purpose grain and forage variety) can be recommended for forage production! AB Tofield seed can be obtained from SeCan.*

Malting Barley Varieties for Forage Production:

- Fifteen varieties were evaluated for forage production.
- Highest forage dry matter yield (12.6 MT/ha) was obtained with *CDC Fraser*/and *CDC Copper* followed closely by *CDC Kindersley* (12.0 MT/ha) and *CDC Copeland* (11.94 MT/ha).
- Averaged over 2021-2023, *CDC Copper* (11.45 MT/ha) and *Torbellino* (10.41 MT/ha) produced the highest forage dry matter yields. Dry matter yield from *CDC Fraser* yield (10.18 MT/ha) was more or less the same as that from *Torbellino*.
- *Butta 12* (13.4 %), *AAC Goldman* (12.6 %) and *CDC Kindersley/KWS Kellie* (11.8/11.7 %) had higher protein content than the other varieties (8.3 % to 10.9 %).
- Averaged over 2021-2023, *AAC Goldman* (11.3 %), *CDC Fraser* (10.8 %) and *CDC Bow* (10.4 %) had higher protein content than the other varieties (9.2 % in *AAC Synergy* to 10.3 % in *TR14617* and *CDC Copper*).
- *UC Capay* had the highest RFV (171) followed by *UC Tahoe* (147).
- Averaged over 2021-2023, *Torbellino* had the highest RFV (149) followed by *CDC Copper* (133)
- *Considering the dry matter yield and RFV over three years, CDC Copper can be recommended for forage production! CDC Copper is a dual-purpose variety (grain and forage production) and its seed can be procured from FP Genetics.*

Evaluation of Urea, ESN, Urea SuperU, Their Blends, and Urea Treated with Anvol for forage production of winter wheat:

- Forage dry matter yield of winter wheat without N application was 16.7 MT/ha.

- ESN @ 120 kg N/ha produced the highest forage dry matter yield of winter wheat (22.2 MT/ha; 5.5 MT/ha higher than in No N check), followed by urea @ 90 kg N/ha + urea superU @ 30 kg N/ha (21.4 MT/ha). Dry matter yield with urea @ 120 kg N/ha was 19.8 MT/ha.
- The treatments that gave higher protein content than all other treatments were, urea superU @ 120 kg N/ha (8.9 %), urea treated with Anvol @ 120 kg N/ha (8.8 %), urea @ 120 kg N/ha (8.3 %), and urea @ 60 kg N/ha + ESN 60 kg N/ha (8.2 %).
- RFV was highest with urea @ 60 kg N/ha + ESN 60 kg N/ha (128), and urea treated with Anvol @ 120 kg N/ha (127). Next best treatment for high RFV was urea @ 160 kg N/ha (121).

Alfalfa Varieties (Seeded in 2020): Two cuts were taken!

- Two western alfalfa varieties (*Revolution MD* and *Response WT*) were compared with two Atlantic Canadian varieties (*AAC Trueman* and *Elite*); *WL319HQ* (RR alfalfa) was a check variety.
- *Response WT* (8,508 kg/ha), *Elite* (8,406 kg/ha) and *Revolution MD* (8,319 kg/ha) gave around 1 MT/ha higher dry matter yield than *AAC Trueman* (7,367 kg/ha) and Roundup Ready *WL319HQ* (7,337 kg/ha). However, the yield differences between the varieties were non significant.
- Averaged over three years (2021-2023), *Response WT* produced the highest (7,632 kg/ha) and *AAC Trueman* the lowest (6,789 kg/ha) dry matter yield. Plant/stem count over the years in *AAC Trueman* had come down, which probably resulted in its lower yield.
- In the first cut, *Elite* recorded the highest (21.4 %) and *AAC Trueman* (18.0 %) the lowest protein content. Protein content in *Response WT*, the highest yielding variety, was 18.3 %.
- In the second cut, *Response WT* (22.5 %)/and *AAC Trueman* (22.4 %) had the highest and *Revolution MD* had the lowest (20.9 %) protein content.
- RFV was highest in *Elite* (128) in the first cut and highest in *AAC Trueman* (140) in the second cut, followed closely by *Response WT* (137). Higher RFV could mean higher milk yield.
- Third cut was also taken this year. Yield trend with the three cuts was the same as that with the two cuts.
- *Considering the dry matter yield, protein content and RFV, Response WT, Elite and AAC Trueman can be recommended for cultivation on farms.*

Alfalfa Varieties (Seeded in 2021): Two cuts were taken!

- Six alfalfa varieties were compared for their forage yield and quality.
- *Revolution MD* gave the highest (6,867 kg/ha) and *Evermost* (5,615 kg/ha) the lowest dry matter yield.
- Protein content in the first cut ranged from 16.9 % in *Dynasty* to 21.3 % in *SW 4107*.
- Second cut protein content didn't vary much with the varieties (22.2 % in *SW 4107* to 23.3 % in *Shockwave BR*).
- *Evermost* had the highest RFV (122) in the first cut and *Revolution MD*/and *SW 4107* had the highest RFV (134) in the second cut.
- Averaged over 2022 and 2023, *Revolution MD* gave the highest dry matter yield (5,421 kg/ha), followed by *SW 4107* (5,199 kg/ha) and *Shockwave BR* (5,028 kg/ha).

Alfalfa Row Spacing and Rates of Sulphur (S) Application (Seeded in 2020):

- Pre seeding S test in this experiment was 8 ppm S.
- Seed rate was kept the same with all the row spacing treatments. In the previous years, highest alfalfa dry matter yield (4,982 kg/ha) from two cuts was obtained with missing one row after every two rows and application of S @ 36 kg/ha. This year, regular seeding at 15 cm spacing (8,877 kg/ha) or missing alternate rows (8,710 kg/ha) with S @ 36 kg/ha gave the highest dry matter yield.

- Averaged over rates of S application, dry matter yield didn't vary significantly (7,756 to 8,241 kg/ha) with the row spacing/geometry, though missing alternate rows produced the highest dry matter yield (8,241 kg/ha) numerically.
- Averaged over rates of S application and years, dry matter yields from regular seedings at 15 cm, missing alternate rows and missing one row after every two rows were similar; 6,291, 6,053 and 6,284 kg/ha, respectively.
- Averaged over row spacings/geometry, application of S @ 36 kg/ha recorded the highest dry matter yield (8,528 kg/ha), which was significantly higher than the yield at 24 kg S/ha (~7,700 kg/ha). The trend was similar when the yields were averaged over row spacings/geometry and years; 6,589 kg/ha at 36 kg S/ha and 6,006 kg/ha at 24 kg/ha. *Clearly alfalfa needs 36 kg S/ha*.
- Averaged over S rates and years, missing one row after every two rows had a little bit higher protein content in the first cut (19.5 %) as compared to the other treatments (19.1 or 19.3 %). The second cut protein content (21.3 to 21.5 %) varied little with the treatments.
- Averaged over row spacings/geometry and years, 24 kg S/ha improved the protein content in the first cut by ~2 % points. However, increasing S rate above 24 kg S/ha didn't improve the protein content further. In the second cut, application of S @ 24 to 48 kg S/ha didn't increase the protein content over the check (no S treatment).
- RFV was the highest in both the cuts with application of S @ 24 kg/ha.
- *Making all considerations, alfalfa could be seeded at regular row spacings or by missing alternate rows or preferably by missing one row after every two rows (that gave better yield in 2 out of 3 years) and should be supplied with 36 kg S/ha.*

Comparative Performance of Alfalfa and Galega (Seeded in 2011): Two cuts were taken!

- *Galega* gave 670 – 1,240 kg/ha higher dry matter yield than *alfalfa*, which was more grass than alfalfa. Alfalfa stand had become scanty over the years.
- Averaged over 2012 to 2023, *Galega* (6,690 kg/ha/year) produced higher dry matter yield than *alfalfa* (6,135 kg/ha/year).
- *Galega* had 2.6 % point higher protein content in the first cut and 1.7 % point higher protein content in the second cut as compared to *alfalfa*.
- RFV was a bit higher in *alfalfa* (132) than in *Galega* (127) in the first cut, whereas in the second cut RFV was more or less the same in *alfalfa* (136) and *Galega* (135).
- *Higher yield and higher protein content in Galega than in alfalfa, could make Galega a better fodder choice than alfalfa!*

Alternate Forage Legumes (Seeded in 2020): Two cuts were taken!

- *Galega*, *sainfoin*, *alfalfa* and *red clover* were compared for their production potential and forage quality. *Sainfoin* and *Red Clover* didn't survive after 2021.
- Dry matter yields from *Galega*, *alfalfa* and *Trefoil* were 5,946, 9,025 and 6,997 kg/ha.
- In the first cut, *Galega* had 3.8 % point higher protein content than *alfalfa* and *Trefoil* had 2.5 % point higher protein content than alfalfa.
- Second cut protein content was in the order of *Trefoil* (22.6 %) > *Galega* (22.0) > alfalfa (19.9 %).
- RFV in the first cut (162) as well as in the 2nd cut (148) was the highest in *Trefoil*.

Corn Silage Varieties:

- Thirteen silage corn varieties were evaluated for their forage production potential.
- *DKC30-07RIB* (14.6 MT/ha), *MS 6902 R* (14.3 MT/ha) and *DKC29-89RIB* (13.7 MT/ha) recorded higher dry matter yield than the other varieties (10.5 – 13.1 MT/ha).

- Protein content was relatively low and ranged from 6.5 % in *MS 7420R* to 7.8 % in *P7417AM*. *MS 6902 R* which gave high yield had 7.7 % protein content. Protein content in *DKC30-07RIB* was 7.0 %.
- *DKC29-89RIB* (212) and *P7211AM* (208) had considerably higher RFV than the other varieties (112 - 178).
- Based on two years (2021 and 2023) averages, *DKC26-40RIB* (18.5 MT/ha), *DKC29-89RIB* (18.4 MT/ha) and *DKC30-07RIB* (18.0 MT/ha) gave significantly higher dry matter yield than the other varieties.
- *Considering the yield from the two years, DKC26-40RIB, DKC29-89RIB* and *DKC30-07RIB* could be recommended for cultivation on farms*!*

Sorghum Sudangrass Varieties:

- Four *Sorghum Sudangrass* varieties were tested for their production potential.
- *SS2 BMR* registered the highest dry matter yield (10.8 MT/ha) followed by 9.4 MT/ha by *Pacific Grage Brand Hybrid*. Dry matter yield in the two other varieties were 8.8 MT/ha in *BMR* and 8.7 MT/ha in *Summer Select*. However, the yield differences between the four varieties were not significant.
- In the first cut, *BMR* recorded the highest (19.2 %) and *Pacific Grage Brand Hybrid* the lowest (14.8 %) protein content.
- In the second cut, *SS2 BMR* had the highest (20.9 %) and *BMR* had the lowest (16.5 %) protein content.
- In the first cut, RFV was the highest (147) in *BMR*, whereas *SS2 BMR* had the highest (123) RFV in the second cut. We need to repeat the experiment for two more years to make any recommendation.

Union Forage (Seeded in 2021): Two cuts were taken!

- Twelve treatments involving forage legumes alone or blends of legumes/and grasses were evaluated for forage production and feed quality.
- Dry matter yield from two cuts ranged from 3,583 kg/ha with grasses blend (50% *Timothy*, 42.5% *Brome Grass*, 7.5% *Orchard Grass*) to 6,394 kg/ha with legumes blend (75% *Grazing Alfalfa*, 25% *AAC Sainfoin*) – same trend as last year. Two next best treatments, with legumes blends, were *Grazing Alfalfa* alone (5,612 kg/ha) and *NirtoMaster – SA + Barricade* (5,354 kg/ha).
- *AC Langille Trefoil* had the highest protein content in the first (22.8 %) as well as in the second cut (23.8 %). Two other treatments that had reasonably good protein content in the first cut were *Grazing Alfalfa* alone (19.4 %) and 75% *Grazing Alfalfa* + 25% *AAC Sainfoin* (19.2 %). In the second cut, 75% *Grazing Alfalfa* + 25% *AAC Sainfoin* (22.3 %) and *NitroMaster – V + Barricade* (22.2 %) were the next best in the protein content.
- RFV was the highest (137) in *AC Langille Trefoil* in the first cut, whereas in the second cut RFV was 1 point higher in *AC Bruce Trefoil* (166) than in *AC Langille Trefoil* (165).
- Averaged over 2022 and 2023, 75% *Grazing Alfalfa* + 25% *AAC Sainfoin* produced the highest dry matter yield (5,106 kg/ha).
- *Combined cultivation of alfalfa and sainfoin could therefore be recommended!*

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