Can hairy vetch be a worthwhile companion in grain corn & grazing corn strategies, or is it just another big hairy monster?

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Introduction
Corn production on the Canadian prairies for both grain and forage has been increasing in recent years. As fertilizer prices increase, the reduction of reliance on synthetic fertilizer inputs is of interest to producers. Additionally, the focus of many producers is shifting to sustainability as they look for ways to protect their crops and soils. Intercropping is becoming a popular option for producers who wish to integrate sustainable systems into their operation, as intercropping has been shown to benefit soil health, reduce pest pressure, and increase residual soil nitrogen content if a legume is included in the intercropping system. Intercropping corn with hairy vetch (Vicia villosa Roth) has been shown to provide many benefits to a field, including protection against soil erosion and improved weed control due to hairy vetch’s creeping growth habit (Brainard et al., 2012). In addition, nitrogen fixation by hairy vetch may result in reduced expenses on fertilizer, improved potassium availability for subsequent crops, and improved soil biodiversity (Cook et al., 2010; OMAFRA, 2012). Intercropping corn with hairy vetch may provide producers with the opportunity to use the intercrop as cattle feed by either grazing the whole system or removing the corn grain and grazing the corn stubble and vetch. This trial examined the effects of intercropping corn with hairy vetch at various corn seedling rates on corn grain yield, corn biomass, vetch biomass, total field nitrogen derived from biomass, residual soil nitrogen, and feed quantity and quality for cattle grazing.

A small plot trial was grown at Westman Agricultural Diversification Organization (WADO) near Melita to observe these two crops’ responses when grown together and to find any good or bad situations with the combination.

Methods
Location Info: NW 6-4-26 W1, near Melita MB
Soil Series: Marmel loamy sand
Previous Crop: Spring Wheat (2020) and Corn (2021)
Crop Years Grown: 2021 & 2022
Rainfall: 286 mm and 149 mm, Normal 337 mm
Spring Soil Test:
- pH 5.9
- Ca 2.4
- Mg 0.4
- K 2.4
- P 11.5
- Zn 0.2
- Cu 0.6
- Mn 1.5
- B 0.2

Applied Fertilizer: Banded 150N-50P-65K-23S-12n-4Cu-2B actual lbs/ac prior to planting.

Plots were pre-fertilized and air seeded with Seedhawk with hairy vetch at ½” depth prior to planting. Corn planted at 2” depth with a Wintersteiger Dynamic Disk vacuum planter. Plot Size: 2’x30’ rows x 8 m long.

Design:
- Two Factor RCBD, 4 replications, GLM two-way ANOVA, post hoc Tukey (95%), Minlab 18.1.6 software.

Factor 1: Corn Planting Rates 20,000; 26,000 and 32,000 on 30” row spacing

Factor 2:
- Without hairy vetch seeded at 20 lb/ac inoculated with Nodulator SCS (BASF) on 9.5” row spacing

Herbicide Program:
- Roundup Transorb (540 g a.i./L) applied at 0.5 L/ac at 3 leaf corn/vetch stage at 10 imp. gai/ac. Some tolerant kochia was hand weeded in early July.

Vetch:
- Wintersteiger Classic Combine with H2 Grain Gauge with EasyHarvest software assisted by a 2 row x 30” Geringhoff corn header

Herbicides
- April 15: Metolachlor 3.3 lb/a + 2.5 lb/a Triclopyr
- July 22: Roundup Transorb 1L/ac at 3 leaf corn/vetch

Yield Data:
- Harvest began Oct 6, 2021 and some issues with vetch growing upside of corn near the cob which wound around the stalk rollers. Recommend a high cobbing variety if going for grain.

Harvest:
- 2021 Corn Harvest
  - All Stover: 31.53% DM, 0.86% Kjeldahl N, 0.02% Ca, 0.97% Mg, 20.10% ADF, 0.31% AIN, 0.22% NDF, 0.16% Phos, 0.16% Pot, 28.42% TDN
  - Stover without Grain: 31.48% DM, 0.84% Kjeldahl N, 0.02% Ca, 0.95% Mg, 20.09% ADF, 0.31% AIN, 0.22% NDF, 0.16% Phos, 0.16% Pot, 28.41% TDN

Harvest:
- 2022 Corn Harvest
  - All Stover: 31.39% DM, 0.88% Kjeldahl N, 0.02% Ca, 0.98% Mg, 20.20% ADF, 0.32% AIN, 0.22% NDF, 0.16% Phos, 0.16% Pot, 28.42% TDN
  - Stover without Grain: 31.32% DM, 0.87% Kjeldahl N, 0.02% Ca, 0.97% Mg, 20.14% ADF, 0.32% AIN, 0.22% NDF, 0.16% Phos, 0.16% Pot, 28.40% TDN

Results
- Hairy vetch significantly reduced corn biomass by 15% and grain corn yield by 16% but overall did not change total biomass including vetch with or without the grain component (Figure 1, 2, 3)
- Improvements in feed quality with vetch intercrop or corn monocrop system. Acid Detergent Fiber (ADF), Calcium (Ca), Crude Protein (CP), Digestible Energy (DE), Magnesium (Mg), Measurable Energy (Mg E), Neutral Detergent Fiber (NDF), Phosphorous (Phos), Potassium (Pot), Relative Feed Value (RFV) and Total Digestible Nutrients (TDN) values for each treatment and grazing method are presented.

Figure 1. Total Biomass by System (lbs/ac)

Figure 2. Total Biomass by Population (lbs/ac)

Figure 3. Total Biomass by Population (lbs/ac)

Figure 4. Grain Yield by System (lbs/ac)

Figure 5. Grain Yield by Population (lbs/ac)

Figure 6. Grain Yield by Population (lbs/ac)

Conclusions
- Hairy vetch may reduce corn biomass but total biomass of either monocrop corn or intercrop is the same however feed quality is improved.
- Reduction in grain yield with use of vetch occurred
- Results suggest an additional 11-21 lbs/ac N in the field economy when vetch is included (biomass N + soil test N). N-fixation began at flower.
- Vetch vines can cause equipment harvest issues for grain and silage equipment, so system is best for grazing.
- It would be interesting to compare a wet year

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