

Pea-Cereals Intercrops for Silage Production

Project duration: May 2019 – October 2019
Objectives: To evaluate the potential for intercropping with peas
Collaborators: James Frey – Diversification Specialist, Manitoba Agriculture
Jessica Frey – Research Technician, PCDF

Background

The use of corn and barley for silage is well-established in the Parkland region and beyond. Interest in producing high-yielding, high-value silage crops has motivated researchers and farmers to experiment with mixtures of annual cereals and legumes.

The cost of seed is higher for corn silage over cereal silage. The Manitoba Agriculture 2020 cost of production for corn silage estimates the cost of corn seed and treatment at \$92.80/ac, over \$16.88/ac for barley. Producers are motivated to pay higher seed costs for higher anticipated yields for corn silage (averaging 13.03 t/ac for corn over 4.77 t/ac for barley).

Generally, previous studies have found that the dry matter yields for silage mixtures are highest for cereals-only mixtures, and lower when a legume such as pea is included in the mixture. However, including legumes in the mixture can increase crude protein values for silage.

Table 3 shows how the different treatments (Table 1) relate to the nutritional requirements of a breeding herd.

Table 3: Treatments in Relation to Breeding Herd

Class	Crude protein (%)	TDN (%)	Ca (%)	P (%)
Mature cows				
Mid gestation	7	50-53	0.20	0.20
Late gestation	9	58	0.28	0.23
Lactating	11-12	60-65	0.30	0.26
Replacement heifers	8-10	60-65	0.30	0.22
Breeding bulls	7-8	48-50	0.26	0.20
Yearling bulls	7-8	55-60	0.23	0.23

(E. Nernberg, MB Ag & Resource Development)

Materials and Methods

Experimental Design: Random Complete Block Design
Entries: 7
Varieties: Barley: Maverick, Austenson; Oat: Haymaker, Summit; Pea: Lacombe
Seeding: May 16
Harvest: Swathed at 65% moisture

Treatments

Seven treatments were examined, and the seeding rate varied by treatment, according to Table 4. The seeding rates for each treatment were determined following research done by the AAFC Lacombe Research Centre and others. Table 5 shows seeding costs by treatment.

Table 4: Silage Intercrop Treatments

Treatments	Percent of monocrop seeding rate	Seeding Rate (lb/ac)
1 Barley (Maverick)	100%	90
2 Barley-barley (Maverick-Austenson)	75%-75%	68-68
3 Barley-pea (Maverick-Lacombe)	25%-100%	22-150
4 Oat-oat (Haymaker-Summit)	75%-75%	68-68
5 Oat-barley(Haymaker-Maverick)	75%-75%	22-150
6 Oat-pea (Haymaker-Lacombe)	25%-100%	22-150
7 Oat-barley-pea (Haymaker-Maverick-Lacombe)	12.5%-12.5%-100%	11-11-150

Table 5: Cost by Treatment

Treatments	bu/ac			Cost/bu			
	A	B	C	A	B	C	\$/ac
Barley (Maverick)	1.9	-	-	\$7.95	-	-	\$14.91
Barley-barley (Maverick-Austenson)	1.4	1.4	-	\$7.95	\$7.95	-	\$22.53
Barley-pea (Maverick-Lacombe)	0.5	2.5	-	\$7.95	\$12.50	-	\$34.89
Oats-oats (Haymaker-Summit)	2.0	2.0	-	\$7.45	\$6.75	-	\$28.40
Oats-barley (Haymaker-Maverick)	2.0	1.4	-	\$7.45	\$7.95	-	\$26.16
Oat-pea (Haymaker-Lacombe)	0.6	2.5	-	\$7.45	\$12.50	-	\$36.07
Oats-barley-pea (Haymaker-Maverick-Lacombe)	0.3	0.2	2.5	\$7.45	\$7.95	\$12.50	\$35.48

Data collected

Emergence Date:

Population:

Biomass Wet Weight:

Biomass Dry Weight:

Pest Pressure:

Date Collected

May 29 – Jun 4

Jun 11

End of July

Beginning of August

Throughout season

Agronomic info

Previous year's crop:

Soil Type:

Landscape:

Seedbed preparation:

Herbicides:

Cover crop

Erickson Loam Clay

Rolling with trees to the east

Heavy harrowed twice

Pre-emerge application of glyphosate and Heat

Table 5: Spring 2019 Soil Test

Available	
N	156 lb/ac
P	9 ppm
K	170 ppm

All treatments were fertilized with 20 lb/ac actual P.

Results

PCDF tested cereal and pea-cereal mixtures for their potential in producing silage. Table 1 shows the performance of the treatments.

Table 1: Feed Test Values for Silage Intercrop Treatments

Treatment	Yield (% of Check)*	Crude protein (%)**	TDN (%)**	Ca (%)**	P (%)**
Barley only (Check)	100	10.20	67.61	0.37	0.17
Barley-barley	103	11.01	68.62	0.30	0.20
Barley-pea	89	10.55	72.90	0.33	0.17
Oat-oat	88	10.80	69.76	0.29	0.18
Oat-barley	115	12.08	71.29	0.51	0.21
Oat-pea	74	13.40	66.02	0.55	0.22
Oat-barley-pea	83	12.23	69.01	0.54	0.23

* Adjusted to 65% moisture content

** Dry matter content

Overall, mixtures including peas yielded lower than cereals-only varieties. Table 2 shows the comparison of statistical significance for yield, crude protein and TDN.

Table 2: Statistical significance for yield, crude protein and TDN.

Treatment	Yield	Crude protein	TDN
Significantly different from check?			
Barley only (Check)	N/A	N/A	N/A
Barley-barley	No	No	No
Barley-pea	No	No	Yes ↑
Oat-oat	No	No	No
Oat-barley	Yes ↑	No	Yes ↑
Oat-pea	Yes ↓	Yes ↑	No
Oat-barley-pea	Yes ↓	Yes ↑	Yes ↑